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No. 1.

PRACTICAL AND POPULAR ENTOMOLOGY.—No. 26.

THE PREPARATION OF BEETLES FOR THE MICROSCOPE.

BY H. F. WICKHAM, IOWA CITY, IOWA.

Twenty-five years ago the use of the compound microscope in the study of beetles was comparatively uncommon, nearly all collectors being satisfied to do what they could with a hand lens and to take the rest on trust, sending the majority of their smaller captures to some "authority" whose word must necessarily be law. There is now a decided and growing tendency in America to break away from the traditional method of obtaining names, and this feeling is reflected in several letters received from correspondents asking information on matters of technic. The accompanying notes are offered as an outline which may be followed at light expense by any one who has access to a microscope, and while no originality is claimed for the processes, they are presented in this form in hope that they may benefit some student who has not the privilege of studying under professional supervision, and who is without manuals on microscopical methods. While capable of extension and modification in many directions, the plan here outlined suffices for all ordinary study of external structures so far as they concern the present-day classification of Coleoptera. Larvæ may be prepared in the same way.

Such structures as those pertaining to the sclerites of the ventral surface, the main points of sculpture and vestiture, the insertion and general form of the antennæ, and even the shape and armature of the mentum may be made out with comparatively little difficulty in all but the smallest beetles by any one who has a good hand lens and who will take pains to compare these structures as illustrated by a few identified forms with those he desires to investigate. In other words, progress should be from the known to the unknown rather than the taking up of the latter as a distinct proposition. Ordinarily the parts requiring investigation under high power are the legs and antennæ of small species, with the aim of determining accurately the number and proportions of the joints, the extent of ankylosis, and so on; the mouth-parts of even the larger

species ; occasionally the spiracles are of great interest, though but little studied, while the sculpture and markings of the elytra are sometimes beautifully brought out by rendering them transparent and examining by transmitted light. It is well worth the time of any entomologist to study closely under higher powers the mouth-parts and other appendages of even the larger beetles, as he gains in this way a familiarity with the normal appearance of these structures in various groups, and the interpretation of generic and specific characters in more obscure types becomes a matter of less difficulty. If one has dissected a large number of insects and studied them carefully, he is the better qualified for understanding the visible portions of those forms that are too rare to be cut up or whose integuments are so thick and clumsy as to be unavailable for balsam mounts.

For dissection, alcoholic specimens are usually preferable to dry ones, but the latter may be prepared readily by relaxing in the ordinary manner in a softening dish or by soaking for a few minutes in hot water. The principal objection to the use of dried specimens is that such material is more likely to be dusty and to give trouble in getting clean mounts, or else to contain so much air as to make extra work in getting rid of the resultant bubbles.

The tools needed are few. A pair of fine forceps, a slender-pointed scalpel, and a pair of small scissors with sharp, delicate blades are required, and may be obtained from any dealer in microscopical supplies. These may be supplemented by a couple of dissecting needles, made by cutting off the heads of two insect pins and forcing the blunt ends into handles of soft wood, about the size of ordinary penholders. The needles are useful in holding specimens while cutting. A block of clean soft wood, against which to cut when separating the insect members, will be found convenient and will preserve the edge of the scalpel.

The chemicals required are : (1) a small bottle of 15% aqueous solution of caustic potash ; (2) a quantity of commercial alcohol, which runs about 90% ; (3) some absolute alcohol ; (4) clearing fluid, which may be oil of cloves, or, if preferred, a mixture made by adding pure spirits of turpentine to an equal quantity of liquefied crystals of carbolic acid ; (5) some hard (dried) Canada balsam dissolved in enough pure benzole to make a freely-flowing fluid. This should be kept in the special balsam bottle sold for the purpose, and may be thinned with more benzole as it becomes thicker with age. The dishes in which the chemical treatments are

carried on should be of some type that is easily covered, for protection of the contents from dust and evaporation, and for the sake of economy should be small. Those known as watch glasses answer well, but deeper glass dishes with separate covers are preferable. The potash mixture may be had at any drug store, the absolute alcohol, clearing fluid, and balsam, as well as the dishes, may be purchased from any good supply house for microscopical materials. Slides and cover-glasses for the mounts are to be procured at the same places.

In dissecting beetles, the following sequence has been found convenient, though it may be varied in some cases. As each part is cut off it should be placed at once in a dish of clean water.

1. Take off the legs, being careful not to destroy the coxa if it is desired to include that joint in the mount.

2. Remove the elytra and hind wings if they are wanted, otherwise they may be left on the specimen, unless abdominal dissections are required.

3. If the spiracles are to be examined, take the scissors and separate the lower part of the abdomen from the upper, cutting along just below the sharp lateral edge. As a rule the spiracles are found in the upper portion, the lower may usually be discarded.

4. Cut off the head. Remove the antennæ carefully by digging them out of the cavities in such a way as not to injure the basal joints. Take off the mandibles by forcing each one outward with the point of a heavy pin until it comes loose at the articulation. Now split the head by forcing the tip of the scalpel (which should be long and slender) into the posterior foramen or neck, opening and cutting through one side against the soft wooden block, afterwards turning the instrument over and cutting through the other side. This will separate the top of the head from the lower half. Remove the labrum from the upper half. From the lower the maxillæ may now easily be dissected, since their bases are exposed from above, and the labium may be trimmed loose from the remaining tissues. Frequently the mentum is so thick that it is better to study it with a hand lens and to be content with detaching the ligula and palpi for the microscope.

Throughout the process of dissection care must be taken not to allow the specimen to dry, or it will become brittle and permeated with air bubbles. The parts may safely be left in water for a day or two, or they may be started immediately on the processes leading up to the final mounting, the steps being as follows :

1. Place the specimens (except the hind wings, which should not be treated thus) in a dish containing some of the potash solution. This substance disintegrates the muscular and other body tissues quite rapidly, but affects the chitinous framework on which our classifications are based, but very slowly, though the dissolution of enclosed pigments renders the hard parts more transparent. The objects must remain in the potash until they are sufficiently softened to permit of the muscular debris being removed easily and the chitin rendered fairly clear. In many instances this will require but a few hours, or it may take several days, the length of time depending on the thickness, solidity and pigmentation of the dissection. The true way of judging is through experience, which is soon gained. Ordinarily considerable latitude may be allowed the time of immersion, a few hours more or less making little difference in the majority of cases. The mouth-parts of most beetles should be soaked at least twenty-four hours, the legs somewhat longer, while the mandibles and elytra are still more refractory. If it is desired to hasten the process the solution may be kept warm, but on the whole it is preferable to carry on all operations at the natural temperature of the room.

2. Take the specimens out of the potash and lay them in a dish of clean soft water. By pressure with the finger-tip carefully squeeze out the fluid remains of the internal organs, muscles, and so on, being particular to direct the discharge through a natural opening or through one of the orifices where the member was amputated. Place for a short time in another dish of clean water to get rid of most of the remaining potash.

3. Change the dissections to a dish of commercial alcohol. The hind wings may now be added and carried through the rest of the stages along with the other pieces. Leave in the alcohol for at least several minutes, or until some convenient time when the next change may be made.

4. Remove to absolute alcohol. This is for the sake of getting rid of all traces of water, since future successes depend largely upon thorough dehydration. Give the specimens plenty of time, several hours if convenient, since no damage arises from prolonged immersion.

5. Transfer the parts to clearing fluid. Let them remain in this for several hours, since in thick specimens the process of permeation is slow. Thin structures will clear in a few minutes, but if the work is hurried the balsam is likely to be clouded when the object is mounted.

6. Take one of the glass slips upon which the final mount is to be made, and, after carefully cleaning it, place in the middle a large drop of

balsam. With fine forceps lift the dissections from the clearing fluid and arrange them in the drop in approximately the order you wish to preserve. If necessary apply a little more balsam, then put on a clean cover-glass, pressing it lightly into place. Should too little balsam have been used more may be run in under the edge of the cover by capillary attraction, while any surplus should be left on the slide until dry. Care should be taken to select parts of about the same thickness for each mount, since thick objects like mandibles sometimes hold the cover so far off from smaller parts that these latter will twist and turn before the balsam hardens enough to hold them in place. If it is desired to support the cover in any place, to keep it from rocking out of level, small pieces of glass may be employed, since they are not conspicuous among the dissections. Any disarrangement of the objects may be corrected by inserting a very fine pin under the cover-glass and moving them into the required positions. When everything is satisfactorily placed, set the slide away in some safe spot, where it will lie flat until the balsam hardens. This hardening may be hastened by gentle heat, such as is afforded by a radiator, but the balsam is likely to become discoloured if allowed to get too warm. The process of hardening may not be completed before several weeks, but when it is satisfactorily finished the surplus may be scraped off with a sharp knife and the slide carefully washed with alcohol applied on a rag. If this leaves a misty scum, breathe on the glass and polish with a soft cloth, taking care not to tear off the cover-glass and the mount. In final storage the slides should always lie flat, never set them on edge. The manner of labelling may be left to personal taste, but a convenient method is to paste a square of gummed paper on one end of the slide, writing thereon the necessary data.

DR. WILLIAM MORTON WHEELER, who, during the past summer, accepted the professorship of Economic Entomology in Harvard University, has recently been appointed honorary Curator of social insects in the American Museum of Natural History, where, until the present year, he had been Curator of the Department of Invertebrate Zoology since 1902. At the close of his term of service at the Museum, he presented to the institution his entire collection of Formicidæ—the result of many years of earnest effort and study—a gift of such value as to make the Museum the possessor of the finest collection of its kind in America, and one of the three largest in the world.—*Science*.

EVERES COMYNTAS—AMYNTULA.

In working out the *Everes argiades* group with Dr. Chapman and Mr. Tutt certain definite specific conclusions have been arrived at. *Coretas* is distinct from *argiades*, and *decolorata* has been shown to be a colour form of the former; this Mr. Tutt proves conclusively in the October and November numbers of the Entomologists' Record, recently issued. In dealing with the Indian species Dr. Chapman and I have found that species considered by De Nicéville to be *argiades* resolve themselves into at least three species, if not four. Whilst in China and Japan we have the meeting place of both the European species and the Indian species almost in a state of flux. *Argiades* and a variety certainly occur there; *parrhasias* occurs in Japan, *dipora* apparently occurs in China, though we require a little more material to settle the question, and without going into the species occurring in the Malay Region and Australia, which are now well known, we are left in a state of some uncertainty with those obtaining in the Nearctic Region. *Comyntas* is a very close ally of *argiades*; in fact, from the genitalia, we should hardly be justified in separating them; *amyntula* appears to be a form going along the lines that *coretas* has gone over, but as yet not having gone so far, perhaps, but in England we suffer from a lack of material to enable us to investigate the matter. This, therefore, is the object of my note. Will Canadian entomologists help us? Will any American entomologists who may read these words also help us? If so, we shall be most grateful. I shall be glad to purchase (or to make a return by way of exchange) as much material from different localities as I can get. I am desirous of obtaining all the forms allied to *comyntas*, and I should like to have specimens from East and West, from North and South, from the Central States; in fact, from as many localities as possible. I should then be able to deal with the whole group in, I hope, a satisfactory manner, and I trust by the correspondence that may possibly ensue with our fellow-observers across the water that some new and perchance unrecorded facts concerning the life-histories of the species may be brought to light.—GEORGE I. BETHUNE-BAKER, 19 Clarendon Road, Edgbaston, Birmingham, England.

WE REGRET to learn from *Science* (Dec. 11, 1908) that "MR. A. H. KIRKLAND, Superintendent of the Massachusetts State work against the Gypsy and Brown-tail moths, has resigned his office."

LEPIDOPTEROUS GALLS COLLECTED IN THE VICINITY OF TORONTO.

BY DR. WM. BRODIE, TORONTO.

Gnorimoserema (Gelechia) Gallaesolidaginis, Riley.

(The Low Solidago Gall.)

Galls usually on the lower third of the stems of *S. Canadensis*, occasionally on the upper third, rarely at the summit of the stem. The galls vary in form from spindle form to prolate and oblate spheroid; and in size from 10 x 21 mm. to 18 x 30 mm.

When young the producer larvæ are confined in small cells, but when mature the cells are large, retaining the form of the exterior of the gall, the larvæ moving freely about feeding on the interior surface.

Some observers say the interior of the gall is lined with silk. I have never found this, but preparatory to the exit, the mature larva before pupating constructs a silken hammock in the upper end of the gall, at right angles to the axis of the gall, and opposite the aperture of exit. The larva resting in this hammock bites out a hole to the epidermis of the gall, which is carefully left. This hole is bevelled towards the outside, and then neatly filled up with the material gnawed out, mixed with a silk-like substance, doubtless from a gland, which forms a tight-fitting, hard plug which cannot be pushed in from the outside, but is easily pushed out from the inside.

The mature pupa places itself on the hammock, and using a part of it as a fulcrum, pushes out the plug, and enters on mature life.

A fair instance of the mental make-up of insects evidences two important attributes of mind, memory and choice.

I have kept up a somewhat continuous acquaintance with this common Solidago gall, its producer, and parasites since the summer of 1856. I have found it in Essex, London, Owen Sound, Bruce Peninsula, Manitoulin, St. Catharines, Napanee, Temagami and Algonquin Park. It is common in Muskoka, we may say common throughout Ontario.

Although most common on *S. Canadensis*, it is occasionally found on *S. nemoralis* and *S. serotina*.

From Manitoba, Saskatchewan and Alberta I had galls sent to me collected from some species of Solidago, which in structure were similar to Toronto galls. But as I failed in rearing producers, identity was uncertain, although the parasites were the same as Toronto species.

Records of annual collections of galls, from 1876 to 1896, showed the time of emergence of the producers to be from about Aug. 20 to Sept. 1, in each year.

January, 1909

In a collection of over 100 galls, made about 12 miles east of the city, from Sept. 1 to Sept. 15, 1886, all the producers had emerged. About 50% of the galls were parasitized, principally by *G. gelechiae*. These, from 12 to 20 pairs from each infested gall, emerged during the last week of September and the first week of October, 1886. I find they always leave the gall before winter.

The *Pimplas* began to emerge April 17, 1887. Seven pupæ of an *Ichneumonoid* were put in a separate jar, the imagoes began to emerge June 1, 1887, but from one pupa there emerged an *Ormyrus*, proving this *Ormyrus* to be a secondary.

From a collection of galls made at Grimsby in May, 1892, the growth of 1891, *Pimplas* emerged from June 1 to June 13, 1892. At this last date galls of the year were fully grown.

The moths pass the winter in some secure dry place, such as under the bark of dead trees. I have kept specimens over winter several times in my cellar, the following season they pair and oviposit on *Solidago* plants when they are less than half-grown.

The most common primary parasites are the "Inflating Chalcid," of Riley; *Copilosomagelechio*, of Howard, which emerges the same season, usually in September; it is not likely they find another host of the season, but hibernate in the imago form. The inflated skin of the producer larva is like a sack full of the larvæ and semipupæ of the parasite.

Two common parasites are *Pimpla inquisitor* and *Pimpla pteralis*, the last not quite as common; and that ubiquitous scourge of leaf-eating insects, *Cryptus extrematis*, not rare. These, with an *Ichneumonid*, not yet identified, are the primary parasites I have had from this gall.

The only secondary parasite which I have found in this gall-life system is that world-wide regulator of life-relationship in the insect world, *Dibrachys boucheanus*.

I found this secondary in the galls collected near Grimsby and in a lot collected near Prescott. The occurrence of this secondary in the *Solidago* gall may be of much economic importance, for, as *Dibrachys* is a check on the primary parasitism of the codling moth, the co-host relationship may be favourable to the secondary or otherwise.

The agency of parasitism is powerful, and should not be discounted by economic entomologists, and while destroying the injurious, it is wise to utilize the safeguards which nature has provided. It is, unfortunately, true that we know of but few cases in which plant-eating species can be successfully combated while in the imago form.

NOTES ON TENTHREDINOIDEA, WITH DESCRIPTIONS OF NEW SPECIES.

BY S. A. ROHWER, BOULDER, COLO.

PAPER II (SPECIES FROM NEBRASKA).*

The material upon which this paper is based belongs to the University of Nebraska. I wish to thank Mr. H. S. Smith for the loan of the above-mentioned material.

In Paper I, p. 180, read *Lycota* for *Lycasta*.

Emphytus Gillettei, Roh. (CAN. ENT., June, 1908, p. 178), equals *Emphytus Gillettei*, MacG. (Rept. of State Entomologist of Colorado, 1902). This insect is injurious to strawberries around Denver. It was bred by Mr. S. A. Johnson, of Ft. Collins. Commonly called "The Strawberry Saw-fly."

Dolerus femur-rubrum, n. sp.—♀. Length, 8 mm.; length of anterior wing, 7 mm. Head finely, densely punctured, denser on front, sparser on occiput and cheeks; frontal furrows not extending beyond ocelli; ocelli in an almost equilateral triangle, distance between hind ocelli less than to the nearest eye margin; antennæ rather short, third joint a little longer than fourth; clypeus deeply emarginate, lobes broad; middle lobe of mesonotum finely, densely punctured, lateral lobes more sparsely so, and more shining; scutellum about as lateral lobes, perhaps a little denser; scutellar appendage smooth, shining, middle ridge strong; mesopleura with large punctures; mesopectus shining, finely punctured; claws with a small tooth in about middle; venation normal; abdomen shining; sheath obliquely rounded. Colour black; labrum, tegulæ, *pallid*; clypeus and apical palpi joints piceous; abdominal segments 1-6 ferruginous, venter somewhat brownish; femora rufous (four posterior pairs somewhat brownish), rest of legs dark brown or black; wings hyaline, nervures and stigma black; face and thorax with short white pile.

Habitat.—West Point, Nebr., June, 1888. Type in Nebraska University.

Separated from *D. albifrons*, its nearest ally, by its larger size, the claws with an inner tooth, trochanters and hind tibiæ being black. It is also somewhat related to *D. minusculus*, MacG., but the head is without a carina, the lateral lobes of mesonotum are punctured, collar is black, etc.

*Paper I was published in the June number (1908) of the CAN. ENT., Vol. XL, pp. 175-180.

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A ♂ from Sioux Co., Nebr., July, may be the male of this species, but I am not sure. Length, 6 mm.; the lateral lobes of mesonotum are more shining, wings darker, legs below coxæ rufous, tarsi infuscated.

Dolerus Piercei, n. sp.—♀. Length, 8 mm.; length of anterior wing, 8 mm. Head rather densely punctured with large punctures, those on the vertex and occiput sparser; frontal furrows not extending beyond ocelli; head behind a line joining superior orbits raised; antennæ rather stout, third joint a little longer than fourth; ocelli in a low triangle; distance between hind ocelli much less than the distance from them to nearest eye margin; clypeus deeply emarginate, lobes broad, rounded; middle lobe of mesonotum rather densely punctured, lateral lobes more sparsely punctured; mesopleura punctured as middle lobe of mesonotum; mesopectus shining, with some distinct punctures; scutellum probably more densely punctured than lateral lobes; scutellar appendage longitudinally striated; claws with a middle tooth; venation normal; abdomen shining, smooth; sheath concealed more than usual; cerci robust. Colour rugo-ferruginous; head, antennæ, spot on middle lobe of mesonotum, scutellum and appendage, metanotum, not basal plates, mesopectus, lower part of mesopleura, legs, black; wings dusky hyaline, nervures and stigma intense black; head (thorax somewhat) with white pile.

Habitat.—Lincoln, Nebr., April 19-02, "Immodelle" (W. D. Pierce). Type in the University of Nebraska.

Most closely related to *D. bicolor*, Beauv., but may be separated by the different sculpture of scutellar appendage, punctures on lateral lobes of mesonotum sparser, head being raised behind eyes, black on middle lobe of mesonotum, rugous lateral lobes, etc.

Dolerus simulans, n. sp.—♀. Length, 9 mm.; length of anterior wing, 7 mm. Front and lower part of face densely punctured (in some places somewhat striato-punctate); head behind a line from superior orbits somewhat raised, this part is more sparsely punctured and is shining; frontal furrows not extending below ocelli; ocelli in almost an equilateral triangle, the distance between the hind ocelli much less than to the nearest eye margin; antennæ rather stout, third joint somewhat longer than fourth; clypeus deeply, angularly emarginate, lobes pointed; mesonotum with large, separated punctures; scutellum with a little larger and denser punctures; scutellar appendage striated; mesopleura irregularly roughened; mesopectus shining, evenly punctured throughout; claws with an inner tooth, in about the middle; venation normal; abdomen shining; sheath broad, pointed at upper apical corner; cerci shorter than sheath, robust;

apex of abdomen with rather long hair. Colour rufo-ferruginous; head, antennæ, scutellum, metathorax (including basal plates, usually), mesopleura and pectus, legs, two apical segments of abdomen and sheath, black; wings smoky-hyaline, nervures and stigma black; head and thorax with white pile.

Habitat.—Three ♀'s, Florissant, Colo., June and July, 1907, on foliage of *Salix brachycarpa*; ♀, Boulder, Colo., May 12, 1907, on foliage of *Salix lutescens* (S. A. Rohwer); ♀, Dolores, Colo.; ♀, Silverton, Colo., June 20, 1892 (C. P. Gillette); 12 ♀'s, Ute Creek, Costilla Co., Colo., 9,000 ft., June and July, 1907 (H. S. Smith, L. Bruner, R. W. Dawson); ♀, Ft. Garland, Colo., July 12, 1907 (L. Bruner).

In some specimens there is a black spot on anterior lobe of mesonotum. The basal plates are sometimes rufous. The wings vary somewhat in smokiness.

I had confused this with *similis*, Nort., but it is quite distinct, easily separated by these characters: The rufous lateral lobes of mesonotum, entirely black legs, having the mesonotum more closely punctured.

Dolerus Coloradensis, Cress.—I have seen 6 ♂'s from Ute Creek, Costilla Co., Colo., 9,000 ft., July 9 to 23, 1907 (L. Bruner and R. W. Dawson), which I have called the male of *Coloradensis*. It may be briefly described as follows: Length, 9 mm.; structure as in ♀; black; first five abdominal segments rufous; wings rather dark. I have seen ♀'s of this species from the above locality, Larimer Co., Colo., and Halsell, Nebraska, June. The last has the clypeus rufous. Specimens in the Colorado Agricultural College collection, determined by Mr. Harrington as *D. tejonensis*, Nort., are *D. Coloradensis*, Cress., so Mr. Weldon's record of *tejonensis* from Colorado is a mistake (CAN. ENT., Sept. 1, 1907).

Scutellum black; sides of mesopleura above rufous; cerci black; scutellum with a good many punctures; claw-tooth blunt; wings not at all yellowish.....*Coloradensis*, Cress.
Scutellum rufous; mesopleura black; cerci rufous; scutellum almost without punctures; claw-tooth sharp; wings somewhat yellowish... ..*tejonensis*, Nort.

Schizocerus Nortoni, n. sp.—♂. Length, 5½ mm.; length of anterior wing, 5 mm. Robust. Head narrower than thorax, not very strongly transverse; eyes prominent, shining, impunctate; ocelli in a low triangle, distance between the two lateral ocelli about equal to the distance to the nearest eye margin; frontal furrows indistinct; ocellar basin almost

obsolete; middle carina strong; antennæ reaching to about middle of scutellum, third joint bifurcate, clothed with long black ciliæ on under side; clypeus truncate; thorax smooth, shining, but not highly polished; scutellum broadly rounded at apex; first transverse cubitus wanting; third cubital cell wider at the top than at the bottom; stigma regularly rounded on lower margin; lanceolate cell of hind wings longly petiolate; claws simple; posterior femora robust; abdomen as usual. Colour black; mandibles and sides of pronotum piceous; basal plates dull brown; abdomen, except the apical segment and first dorsal segment, ferruginous; four anterior legs below knees pallid; wings dusky-hyaline, nervures and stigma dark brown.

Habitat.—Brady Island, on Platte River, Nebraska. Type in the collection of the University of Nebraska.

This species has its nearest ally in *S. brunniventris*, Cress., but is larger, the tegulæ are black, venation is brown, abdomen ferruginous, etc.

Dedicated to the author of the most extensive work on North American Saw-flies.

Schizocerus lineatus, n. sp.—♀. Length, 6 mm.; length of anterior wing, 5 mm. Rather robust. Head narrower than thorax, not strongly narrowly transverse; eyes prominent, shining, polished; frontal furrows well defined, broadest where they curve around the ocellar basin; ocellar basin quite distinct, walls rounded, pointed at lower margin; middle carina high, sharp; antennal foveæ large; antennæ with some black down; clypeus slightly emarginate; ocelli in a low triangle; thorax shining; claws simple; posterior femora rather robust; posterior tibiæ about a third longer than their tarsi; first transverse cubital present; third cubital cell wider at the top than the bottom; second recurrent nervure interstitial with second transverse cubitus (in one wing it is received in the second cubital cell); abdomen shining; sheath almost entirely concealed. Colour black; mandibles and ocelli piceous; pronotum, tegulæ, lateral lobes of mesonotum, sometimes sides of anterior lobe, line on side of abdomen *reddish-yellow*; four anterior legs below the knees, base of posterior tibiæ *yellowish-white*; wings hyaline, nervures brown, venation rather weak.

Habitat.—Geneva, Nebraska. Co-types in the collection of University of Nebraska and in the author's collection.

A very distinct species, easily known by its size and the pale yellow-red on the sides of the abdomen. The black of the abdomen varies to pale brown.

Schizocerus collaris, n. sp.—♀. Length, 4 mm.; length of anterior wing, $3\frac{1}{2}$ mm. Head narrower than thorax, not transverse; eyes more spherical than usual, shining, impunctate; ocelli in a low triangle, distance between the two lateral ones about equal to the distance to the nearest eye margin; frontal furrows broad, distinct, coming up as high as lateral ocelli; ocellar basin distinct, walls rounded; middle carina strong; antennæ clothed with *short* hair; antennal foveæ large, especially in supraclypeal area; clypeus truncate; thorax shining; scutellum obtusely pointed at apex; claws simple; hind tibiæ about a third longer than their tarsi; first transverse cubitus wanting, second recurrent interstitial, or almost so, with second transverse cubitus; stigma broad at base, tapering to apex; lanceolate cell of hind wings wanting; abdomen shining, sheath well concealed. Colour: head black; thorax and abdomen dark brown; mandibles and ocelli piceous; pronotum, tegulæ, line on side of abdomen, *reddish-yellow*; four anterior legs below knees and base of posterior tibiæ pallid; posterior femora, trochanters and coxæ almost black, rest of legs brown; wings hyaline, venation brown.

Habitat.—Antonito, Conejos Co., alt. 7,888 ft., Colorado; also Nebraska, "office window," March 24, 1899, and Harlan, Nebr.

A ♀ from Nebraska has the ocellar basin very poorly defined, but otherwise seem to agree.

Most closely related to *S. lineatus*, Roh., but is much smaller, and the lateral lobes of the mesonotum are dark brown, not *reddish-yellow*.

Hylotoma nigrescens, n. sp.—♂. Length, $5\frac{1}{2}$ mm.; length of anterior wing, $5\frac{1}{2}$ mm. Front and occiput subopaque, finely punctured, entire posterior orbits shining, with a few small punctures; frontal furrows distinct, wide and with sloping walls below ocelli; ocelli in a low triangle; ocellar basin wanting; middle foveæ large, extending almost to lower ocellus, walls sharply defined, broader above than below; on each side of the broad, high middle carina the supraclypeal area is depressed into a fovea; clypeus truncate; third joint of antennæ ciliate beneath; thorax smooth, shining; scutellum obtusely rounded at apex; middle and posterior tibiæ with a side spur; first joint of hind tarsi a little longer than 2 + 3; tarsal claws simple; venation normal for members of Section II (Ashm., CAN. ENT., 1898); abdomen shining. Colour black; mandibles at apex piceous; legs beyond femora white; femora dark brown; basal two-thirds of wing dusky, apical third hyaline, iridescent; nervures and stigma brown.

Habitat.—West Point, Nebraska, July 1, 1887, "on plum." Type in collection of the University of Nebraska.

The following table separates all the entirely black or blue-black *Hylotomæ* of boreal North America :

- | | |
|------------------------------------------------------------------------------|---------------------------------|
| Length, 12 mm..... | ♂, <i>spiculata</i> , MacG. |
| Length, under 10 mm..... | 1. |
| 1. Colour black ; legs beyond femora pale ; base of wings dark..... | <i>nigrescens</i> , Roh. |
| Colour blue-black..... | 2. |
| 2. Four posterior legs entirely black ; wings violaceous, paler at apex..... | <i>cærulea</i> , Nort. |
| Four posterior legs not entirely black ; wings smoky-hyaline..... | 3. |
| 3. Four anterior tibiæ pale ; costa usually yellowish.... | <i>Macleayi</i> , Leach. |
| Four anterior tibiæ black ; costa black..... | <i>mentzeliae</i> , Ckll. |

Hylotoma grandis, n. sp.—♀. Length, 10–12 mm. Robust. Head narrower than thorax, shining, outer orbits and vertex impunctate, front with a few small punctures ; ocelli in a low triangle ; ocellar basin shallow, joining with the elongate middle fovea ; middle fovea with well defined walls, narrower below ; middle carina broad, strong ; frontal furrows extending as far down as ocelli ; antennal foveæ elongate, broad, extending downward to clypeus ; antennæ subclavate, second joint shorter than first ; clypeus circularly emarginate, densely punctured ; mandibles broad ; thorax shining ; posterior angles of pronotum sharp ; scutellum convex, rounded at apex ; middle and posterior tibiæ with lateral spurs ; all the tibial spurs simple, sharp ; tarsal claws simple ; basal nervure joining subcosta basad to origin of cubitus ; stigma widest at base, tapering to apex ; third cubital cell longer on radius than on cubitus ; hind wings normal ; abdomen as usual. Colour cherry-red ; ocelli piceous ; antennæ black ; head, pronotum in the middle, tegulæ, entire mesonotum, mesopectus ; entire metathorax, all the legs, sheath, *blue black* ; wings very dark, darkest on anterior margin.

♂.—Length, 9 mm. Differs from ♀ in having the antennæ with small hairs, the ocellar basin slightly separated from middle fovea, the basal nervure joining the subcosta at origin of cubitus.

Habitat.—Halsey, Nebr., June, 2 ♂'s, 2 ♀'s. Co-types in the collection of the University of Nebraska and in the author's collection.

This species is closest to *H. humeralis*, Beauv., but the abdomen is without black, second joint of the antennæ is shorter than the first, the

third joint of maxillary palpi is not swollen, etc. In the absence of black from the abdomen and other characters it resembles *H. miniata*, Klug, but the metathorax is blue-black and all the dark markings of *miniata* are black, while in *grandis* they are blue-black.

Macrophya pulchelliformis, n. sp.—♂. Length, 7 mm.; length of anterior wing, $6\frac{1}{2}$ mm. Head narrower than thorax, densely punctured with rather large punctures; ocelli in almost an equilateral triangle, distance between the lateral ocelli much less than the distance to the nearest eye margin; third antennal joint a little longer than fourth; eyes distinctly converging, distance between them at the clypeus a little more than the length of the third antennal joint; clypeus shallowly, squarely emarginate, lobes broad; mesonotum, scutellum, mesopleura punctured similarly to head; mesopectus more sparsely punctured; all tibial spurs simple; first joint of hind tarsi equal to $2 + 3 + 4$; claws rather minutely cleft; stigma broad at base, tapering to apex; transverse radial between apex on middle of the cell; transverse median between middle and base of cell; lanceolate cell contracted; abdomen minutely punctured. Colour black, subopaque; clypeus, labrum, spot on mandibles (rest piceous) *white*; posterior angles of pronotum, tegulae, small spot on scutellum, stripe on pleura, four anterior legs below apical third of coxae (the four anterior tarsi are somewhat reddish), basal plates, posterior trochanters, femora and tibiae, except at apex, line on outside of posterior coxae, *yellow*; apex of abdomen pallid; wings subhyaline, nervures and stigma brown.

Habitat.—Lincoln, Nebr., May. Type in the collection of the University of Nebraska.

This species is nearest *pulchella*, Klug, but may be known from it by the coxae being largely black and having the posterior femora entirely yellow.

Macrophya sambuci, n. sp.—♀. Length, 7 mm.; length of anterior wing, 7 mm. Short, robust. Head narrower than thorax, closely, coarsely punctured; ocelli in a rather low triangle; distance between the lateral ocelli much less than the distance to the nearest eye margin; third antennal joint longer than fourth; eyes converging, the distance between them at the clypeus about the same as the length of antennal joints $2 + 3$; clypeus with well-separated punctures, rather deeply, squarely emarginate, lobes broad, rounded at apex; mesonotum and scutellum finely, densely punctured, the sides of the lobes have the punctures larger; pleura with large, close punctures; mesopectus with fine, close punctures; inner spur

of anterior tibiæ bifid at apex ; first joint of hind tarsi equal to $2 + 3 + 4$; claws minutely cleft ; stigma slightly bulging from costa at base, widest in basal middle, from whence it tapers to apex ; venation normal ; abdomen finely punctured, sheath rounded at apex ; apex of abdomen with rather long hairs. Colour black ; head and thorax opaque, abdomen shining ; clypeus, labrum, spot on mandibles (rest piceous), *white* (in one specimen this white is strongly infuscated) ; broad angles of pronotum, tegulæ, spot on pleura, scutellum, basal plates, apex of four anterior coxæ, four anterior trochanters, four anterior legs below knees (the tarsi are infuscated), stripe on outer side of posterior coxæ, posterior trochanters, base of femora, posterior tibiæ except at apex, first joint of hind tarsi except at apex, *yellow* ; wings yellow-hyaline ; costa, stigma and nervures brown.

Habitat.—Two ♀'s, Lincoln, Nebr., April 19, 1902, "on elder" (*Sambucus*), (W. D. Pierce) ; ♀, Nebraska (J. S. H.). Co-types in collection of Univ. of Nebr. and in author's collection.

This species is related to *pulchella*, Klug, but the coxæ are largely black. It is probably nearest to *zoe*, Kby., from which it may be known by having the anterior femora black all the way round, the middle tibiæ entirely pale, wing not darker at apex, etc.

Eriocampa rotundiformis, n. sp.—♂. Length, $5\frac{1}{2}$ mm.; length of anterior wing, $5\frac{1}{2}$ mm. Short, robust, head almost as wide as thorax ; occiput, vertex, cheeks sparsely punctured with large punctures, inner orbits densely punctured ; ocelli in an equilateral triangle, distance between the lateral ocelli as great or a little more than the distance to nearest eye margin ; furrow on vertex strong, extending to ocelli ; ocellar basin large, well defined, walls sharp, pointed above and extending between lateral ocelli, wall coming to base of each antenna, open at the bottom ; second joint as long as first, but not as broad, third joint as long as $4 + 5$; antennæ a little thicker in middle ; eyes very large, slightly converging below, distance between them at the clypeus about the same as the length of the third antennal joint ; clypeus rather densely punctured, circularly emarginate, lobes pointed ; mesonotum shining, and with very few punctures ; pronotum punctured with punctures about the size of those on the head ; scutellum with large punctures, closest anteriorly ; postscutellum densely punctured ; mesopleura with large, close punctures, larger than those on pronotum ; mesopectus shining, in middle with small punctures ; inner spur of anterior tibiæ bifid at apex ; tarsal claws deeply cleft, inner tooth shorter ; abdomen shining, parallel-sided. Colour black, apex of mandibles piceous ; ocelli hyaline ; anterior legs below coxæ, apex of

middle coxæ, their trochanters, femora, except black band on apical half, tibiæ and tarsi entirely, posterior trochanter, base of their femora, base of tibiæ, and two basal joints of tarsi, *white*; wings hyaline, venation dark brown.

Habitat.—West Point, Nebr., June. Type in the collection of University of Nebraska.

Closely related to *Eriocampa rotunda*, Nort., but the four anterior femora have no black line above, and the middle femora are banded at apex; the third antennal joint is not curved.

Pachynematus nigriritibialis, n. sp.—♀. Length, $6\frac{1}{2}$ mm.; length of anterior wing, $5\frac{1}{2}$ mm. Head widened behind eyes, but not strongly so; frontal furrows distinct; ocellar basin indistinctly defined; frontal crest strong, rather pointed, slightly broken in the middle; two ridges meeting between the antennæ form the frontal crest; middle fovea distinct, oval in shape; antennæ longer than head and thorax, slender, tapering, third and fourth joints equal; antennal foveæ large, shallow; middle carina short, broad below, narrow above; clypeus shallowly, circularly emarginate, lobes small pointed; mesonotum and scutellum shining, with a few irregular punctures; inner claw tooth distinct, in about middle of claw; stigma broadest in middle, rounded on lower margin; in one specimen the second recurrent is interstitial with second transverse cubitus, in the others it is close to it, but not interstitial; venation otherwise normal; sheath rather broad, straight above, rounded below. Colour reddish-yellow; apex of mandibles piceous; antennæ, eyes, spot around ocelli, mesonotum, except sutures, scutellum, metanotum; broad stripe on abdomen above, spot beneath tegulæ, mesopectus, posterior coxæ, spot before them, posterior tibiæ and tarsi, sheath, *black*; posterior femora at apex dark brown; wings hyaline, iridescent, nervures, costa and stigma dark brown.

Habitat.—Two ♀'s, West Point, Nebr., June; 1 ♀, Brownville, Nebr., June 5. Co-types in University of Nebraska and in author's collection.

In Marlatt's "Revision of Nematinae of N. Am.," this runs to *auratus*, Marl., but is separated from that by the black mesonotum, black hind tibiæ and tarsi, smaller size, not having the sheath so sharply pointed, etc. The head is not strongly developed behind eyes, and it might be said to go to *abdominalis*, Marl., but it is very different from that species, known at once by the different colour, different claw tooth, etc. The black hind tibiæ and tarsi will serve to separate this species from its allies.

Pachynematus vernalis, n. sp.—♀. Length, 5 mm.; length of anterior wing, 5 mm. Robust, head nearly as wide as thorax, rather sparsely, finely punctured: enlarged behind eyes; ocellar furrows extending below ocelli, a middle furrow from lower ocellus; ocellar basin indistinct, frontal crest formed of a wavy ridge above antennæ, slightly broken in the middle; third, fourth and fifth antennal joints equal; antennæ slender, nearly as long as insect, covered with short hairs; middle fovea rather large, shallow, round; clypeus shallowly, circularly emarginate; mesonotum and scutellum rather finely punctured, inner claw tooth large, near apex (near the apex and longer on the anterior legs); second cubital cell small, subquadrate; second recurrent quite free from second transverse cubitus; stigma widest at base, gently tapering to apex; upper discal cell of hind wings slightly exceeding lower, much narrower than lower; sheath broad, rounded on lower margin, straight on upper; cerci short, stout. Colour reddish-brown; antennæ above at base, eyes, elongate spot on lateral lobes of mesonotum, posterior third of scutellum, spot on metanotum, black; wings hyaline, iridescent; nervures brown, costa and stigma yellowish.

Habitat.—One ♀ labelled as follows: "Saw-fly on Willow,
Oct. 5, '89.

Feb. 19, '90." Probably

from Lincoln, Nebr., and raised from a larva on the Willow. Type in the University of Nebraska.

The size of the claw and its position makes the generic position of this species open to question. After examining it carefully with the compound microscope, I think it is a *Pachynematus*. In Marlatt's table, for *Pachynematus* it runs to *aurantiacus*, Marl., but is quite distinct from that species, being known by the slightly broken frontal crest, the shallowly emarginate clypeus, cerci short and stout, head without black, etc. It is not close to any *Pteronus*. In *Amauronematus* it is closely related to *brunneus*, Nort., and *Dyari*, Marl., but it is neither of these species.

Amauronematus xanthus, n. sp.—♀. Length, 7 mm.; length of anterior wing, $6\frac{3}{4}$ mm. Head densely, finely punctured, opaque; frontal furrows not clearly defined, not reaching occiput, but reaching antennal foveæ; ocellar basin well defined, walls rounded; frontal crest rather strong, slightly broken in the middle; middle fovea elongate, broader below; antennæ rather stout, joints three, four and five equal; clypeus rather deeply emarginate, lobes broad, more or less rounded; thorax above not as densely punctured as head; mesopleura and mesopectus not so

densely punctured as mesonotum, hence more shining; claws deeply cleft, teeth subequal; stigma rather broad, rounded on lower margin, widest near base; third cubital cell not strongly diverging, not much longer than the third transverse cubitus; upper discal cell exceeding lower on outer margin; sheath broad, rounded on upper and lower margins to an obtuse joint. Colour ferruginous; face below antennæ, clypeus, labrum, mandibles (apex piceous), posterior angles of pronotum, and tegulæ, *pallid*; head back of the eyes, and part of legs, *fulvous*; antennæ, eyes and ocelli black (in one specimen the basal plates and part of metanotum are black); wings yellowish-hyaline, iridescent; nervures brown, costa and stigma yellowish, thorax, especially the pleura, with pale pubescence.

Habitat.—Lincoln, Nebr., two ♀'s, one in April. Co-types in University of Nebraska and in author's collection.

In structure this species is like *A. discolor*, Cress., but differs as follows: Antennal joints 3, 4 and 5 equal, intercostal nervure normal, stigma not acuminate, no black on mesonotum, etc. In colour it is much like *lineatus*, Harrg., but the frontal crest is broken, middle fovea not triangular, etc.

Amauronematus Lincolnensis, n. sp.—♀. Length about 6 mm; length of anterior wing 6 mm. Head opaque, finely, densely punctured; ocelli in a rather lower triangle than usual; ocellar basin only faintly indicated; frontal crest strongly broken; middle fovea distinct, elongate; antennæ short, stout, third and fourth joints equal; clypeus deeply, narrowly emarginate, lobes broad, rounded; thorax not so densely punctured as head; mesopectus smooth, shining; claws deeply cleft, teeth subequal; first joint of hind tarsi equal to 2 and 3; stigma rounded on lower margin; broadest between middle and base; second r. n. not interstitial with second t. c., but near it; scutellum with a distinct middle, longitudinal furrow; postscutellum ridged in middle; sheath broad, rounded at apex, fringed with black hairs; cerci long, slender, not tapering. Colour rufo-ferruginous; apex of mandibles piceous; antennæ, eyes, ocelli, interocellar space, furrow of scutellum and apical margin, postscutellum, metanotum in middle, middle of basal plates, first five abdominal segments, except sides (the black narrows as it nears the apex), margin of sheath, *black*; head below antennæ, collar, tegulæ, legs, *luteous*; wings yellowish hyaline, iridescent; nervures pale brown, costa and stigma yellowish or pallid; head and thorax with short white pile.

Habitat.—Lincoln, Nebr., May. Type in the Univ. of Nebraska.

In Marlatt's table (Nematinæ of N. Am.) this species runs between *fulvipes*, Nort., and *pectoralis*, Cress., but is neither of these, as the clypeus is deeply, narrowly emarginate, the middle fovea elongate, etc.

Pristiphora zella, n. sp.—♀. Length, 6 mm.; length of anterior wing, $6\frac{1}{4}$ mm. Head punctured with medium-sized punctures, rather well separated, closest on inner orbits; frontal furrows not reaching occiput, but distinct just above the ocelli; distance between the lateral ocelli more than the distance to the nearest eye margin; sides of ocellar basin faintly seen below lateral ocelli; middle fovea deep, distinct, slightly elongate; third antennal joint longer than fourth, but only slightly so; antennal foveæ large; middle carina rather distinct, round on top; clypeus very slightly emarginate; mesonotum punctured, but not so strongly so as head; mesopleura and mesopectus shining, impunctate; first joint of hind tarsi longer than $2 + 3 + 4$; inner claw tooth large, in about middle of claw; stigma rounded on lower margin; transverse cubitals hyaline; sheath broad, apical margin with long hairs; cerci long. Colour black; anterior margins of clypeus, labrum, mandibles (apex piceous), broad lateral angles of pronotum, tegulæ, legs entirely (femora reddish), sutures of metathorax at sides, between basal plates, venter, *pallid* or *white*; sheath brown; apex of posterior tibiæ and their tarsi infuscated; ocelli (dry) hyaline; wings clear hyaline, iridescent; venation, except costa, which is *pallid*, brown; head and thorax with white pile, longest on clypeus; spot in second cubital cell small.

Habitat.—One ♀ from Nebraska, probably from Lincoln, May 5, '03. Type in collection of Univ. of Nebraska.

In Marlatt's table (Nematinæ of N. Am.) this species runs to *Koebeleri*, Marl. (Wash. and Alaska), but the abdomen above is entirely black, there is no rugous band before scutellum, and the structure of the head is different.

Euura perditæ, n. sp.—♀. Length, $4\frac{1}{2}$ mm. Rather slender; head in the ocellar region with fine, rather dense punctures; ocelli forming a low triangle; ocellar basin wanting; middle fovea shallow, rather indistinct, circular; antennal foveæ not large; antennæ medium, third, fourth and fifth joints equal; clypeus angularly emarginate, lobes broad, low, rounded at apex; dorsulum with some fine punctures; tarsal claws minutely cleft; intercostal nervure slightly basad to basal; transverse median in middle of cell; upper and lower discal cell of hind wing equal on outer margin; stigma straight on lower margin until about apical sixth,

where it joins the costa abruptly; sheath broad at base, tapering to an obtuse point. Colour black; posterior and upper orbits, face below antennæ, clypeus, labrum, mandibles, except tips which are piceous, palpi, posterior angles of pronotum, tegulæ, legs entirely, apical segments of venter, reddish-yellow; flagellum beneath and entire apical joints rufous; posterior tarsi infuscated. Wings hyaline, nervures pale brown, costa and basal half of stigma pallid.

♂.—Length, $4\frac{1}{2}$ mm. More slender than ♀; differs from the ♀ as follows: ocellar basin present, but very shallow, bounded by low rounded walls; middle fovea shallower; stigma rounded on lower margin; lower discal cell of hind wing slightly exceeding lower; clypeus, labrum, mandibles, pallid. The mandibles are sharp, with a small inner tooth; procidentia rounded at apex.

Habitat.—♀, Delta, Colo., April 23, '97 (C. P. Gillette), "Willow galls"; ♂, Ft. Collins, Colo., March 30, '97 (E. G. Titus), "emerging from Willow galls collected in Jan."; ♀, same as last; ♂, Delta, Colo., April 28, '97 (C. P. Gillette), "Willow galls, flies emerging May 23." The first ♀ and ♂ are the types. Type in the collection of the Colorado Agricultural College.

This species falls near *E. insularis*, Kincaid, and *E. salicicola*, E. A. Sm. It may be known from the former by the different shaped stigma, and from the latter by the more acutely pointed sheath. There are also other characters to separate it from these two species.

MOSQUITO COMMENT.

BY C. S. LUDLOW, PH. D.

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Reference to Dr. Dyar's recent article* is only necessary because his comment on *A. perplexens* mihi, may be construed to imply a carelessness in my work which does not exist. Naturally, Dr. Dyar could not know that the only times any interchange of lids has occurred have been when, at the National Museum, he, Dr. Knab and myself were discussing species, and it was impossible for me to keep track of all the lids; in these cases the mosquitoes were destroyed on my return to my rooms. Moreover, *A. perplexens* was found in a box with typical American mosquitoes which were undoubtedly taken at Gretna, Pa. My boxes are not uniform, nor is more than a small proportion of the collection even temporarily kept in

*Notes on Mosquito Work, CAN. ENT., Sept., 1908, page 312.

them. Dr. Dyar's suppositions as to the manner in which any error may have occurred are, therefore, entirely faulty, and he has apparently forgotten that I consulted him on this species, and he advised its publication.

I am myself, however, inclined to believe that a mistake may have been made in the habitat of this specimen, and that it probably is a Philippine mosquito; just as I feel quite sure that *Grabhamia Spencerii*, Theob., owes its being reported from the Philippines to my very careful and interested Chinese servant, who, of course, would not realize that a dead mosquito picked up in the house and placed in one of the small boxes on my table could make dire confusion, so a similar interference by some uninformed but well-intentioned person may account for *A. perplexens*. At all events, if an error has been made it is not due to an interchange of box lids, and my own precautions are such that no transposition of the mosquitoes themselves could have taken place while in my hands.

In the February number of the CANADIAN ENTOMOLOGIST I described a new anophelina, and referred it to *Chagasia*. Comparison with the *Chagasia* in the British Museum leads me to believe it to be new, and I therefore make it the type of a new genus, *Calvertia*, named in honour of Dr. W. J. Calvert, of St. Louis, formerly of the Medical Corps, U. S. Army, at whose suggestion I began the study of Philippine mosquitoes.

CALVERTIA, nov. gen.

Head with forked scales, antennæ bearing outstanding scales on the second joint and more appressed ones on the first; thorax with curved and broadly fusiform scales, not markedly outstanding laterally; abdomen with hairs, and on at least one segment bearing long flat more or less spatulate scales.

The genus lies near *Chagasia*.

There have lately been received from the Philippines two new mosquitoes described below.

Anopheles formosus, n. sp.—(Female.)

Head brown, with light yellow or white long slender curved scales on the vertex, and projecting forward in a tuft between the eyes, white forked scales on the occiput, and brown forked scales laterad and ventrad; antennæ dark brown, verticels and pubescence brown, basal joint testaceous; palpi brown, rather heavily scaled, the tip light, and bases of penultimate and antepenultimate joints narrowly light-banded, proboscis

dark brown, the labellæ slightly lighter; clypeus brown; eyes dark rich brown.

Thorax beautifully marked; prothoracic lobes dark brown, with dark brown long flat scales; mesonotum has the median part a light soft fawn colour covered with light yellow or whitish curved hair-like scales extending from the nape to the scutellum, except a small brown median spot just cephalad of the scutellum, and connecting with the dark median line; this median part is bordered with a more or less distinct white line, broadening toward the scutellum; there are also broad submedian yellowish stripes extending from the nape about half the length of the mesonotum; laterad the mesonotum is dark rich brown; scutellum light, continuing the colouring and scales of the medio-mesonotum; pleura rather grayish, with dark and white bands; metanotum rich yellowish brown.

Abdomen grayish brown, covered with long light yellow hairs.

Legs: coxæ and trochanters light, with a little brown; the very bases of the femora light, otherwise the legs are a rich brown, with yellowish knee-spots and narrow yellowish bands at the bases of most of the tarsal joints, generally slightly including the apices of the preceding joint. These bands are on all the tarsal joints of the hind legs, and lacking on the fourth and fifth joints on the fore and mid legs; ungues simple and equal.

Wings yellowish, with brown spots; two small brown spots on the costa near the base, and two large ones, the proximal including the subcosta and first longitudinal practically as much as the costa, with a small extension on the root of the second long. vein, and a still smaller one just under the distal end of the large spot; the distal large spot begins just exterior to the junction of the subcosta with the costa, and ending a little interior to the junction of the first long. vein with the costa, and extends onto the first long. and upper fork of the second long. vein, with small spots on the lower fork; the distal end of the lower fork of the second, of the third, of both forks of the fourth and of the fifth, have heavy dark spots; wing-field somewhat spotted; fringe is dark except at the junction of the first long. and costa, where it is yellow, and a pale spot midway between the forks of vein 5; cells long, the first submarginal as long as its stem, and a little longer and narrower than the second posterior cell; supernumerary and mid cross-veins meet, and are about equal in length, posterior cross-vein about as long as the mid, and more than its own length distant.

Halteres have light bases, with heavy dark knob.

Length, 10 mm. (proboscis 3.5 mm.).

Habitat : Camp John Hay, Benguet, P. I.

Taken March 20, 1908.

This large and beautifully marked *Anopheles* is the first of this genus to be received from the P. I., and shows the characteristic habitat of *Anopheles* in the tropics, coming from the high mountain regions of Benguet.

Pseudouranotenia parangensis, n. sp.—(Female).

Head brown, covered with flat scales, dark brown except a broad band of white scales around the eyes, meeting at the vertex, a few black bristles projecting forward; antennæ brown, verticels and pubescence brown, basal joint testaceous; palpi minute, brown; proboscis brown, apex swollen; clypeus brown; eyes brown.

Thorax: prothoracic lobes heavily clothed with white flat scales; mesonotum brown, partly denuded, but with brown curved scales scattered over it and more completely covering it laterally, a line of outstanding white or bluish-white scales extending from the wing joint cephalad about one-half the length of the mesonotum; scutellum brown, with brown flat scales; pleura dark brown, with a pronounced line of white flat scales; metanotum brown.

Abdomen brown, with dark brown scales and a white median spot extending over most of the dorsal aspect on the first, second, third and fourth segments, better developed on the third and fourth; venter light.

Legs: coxæ and trochanters light; femora brown, ventrally lighter; tibiæ brown, and on the fore and mid legs all the tarsal joints brown; on the hind legs the first and second tarsals are brown, the third, fourth and fifth pure white; ungues simple and equal.

Wings partly denuded, mostly brown-scaled, but half the length of the stem of the fifth, and the bases of the sixth with white roundish scales; fringe unspotted; the cells very short, the first submarginal a little shorter and somewhat narrower than second posterior cell; mid and supernumerary cross-veins of about equal length and meet, posterior cross-vein longer than mid and its own length distant interiorly. Halteres with white stem and black knob.

Length, about 5 mm., of which the proboscis is nearly 2.5 mm.

Habitat : Parang Mindanao, P. I.

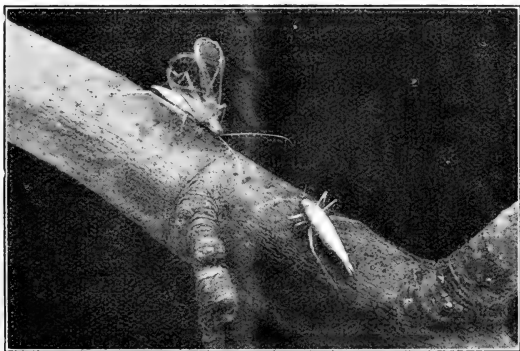
Taken : Collection undated, summer of 1908.

COURTING AND MATING OF *OECANTHUS FASCIATUS*,
HARRIS.

BY J. P. JENSEN, ENTOMOLOGICAL DEPARTMENT, CORNELL UNIVERSITY.

It was my good fortune to observe during the latter part of August, in Southern Minnesota, the courting and mating of *Oecanthus fasciatus*, one of the tree-crickets as yet without a common name, unless we call it the "Dark Whistler," a name proposed by Professor Comstock.

The insect under observation was doing his best, and I watched the wonderful, rapid motion of the wings that were elevated above the back at an angle of about 60 degrees, and making a blur to the eye so fast were they being rasped together. A female was soon seen hurrying up the

FIG. 1.—Courting habits of *Oecanthus fasciatus*.

stem, but still near the base. She stopped, twirled her antennæ and walked a little higher, then ran out on a leaf and back again, plainly guided by the music. When within a foot of the male he detected her presence. The song changed, it was more broken. She ran out on another leaf searching for the male, and he bent out a little farther and apparently redoubled his efforts. The leaves were only a few inches apart, and she either saw or heard that he was still higher up, for she ran back to the stem, mounted to the leaf where the male was and ran out on it, but on the under side, placing herself longitudinally upon it. The male turned, placed himself in similar position and was quiet, the only motion noticed being the swaying and gently stroking together of the black

antennæ over the edge of the leaf. This continued for about five minutes, when the male sought the female on the under side of the leaf. This she apparently resented, and ran out a little farther. The male at intervals advanced towards her, elevating his tegmina and playing short, low notes.

The courting began at 4 p.m. and continued for twenty minutes, when they were both on the upper side of the leaf. At first the male approached the female head first, and when she retreated jumped back with a rapid jerk of the body. During the last ten minutes he made many attempts to slip the abdomen under the female, singing meanwhile the peculiar low notes, but her retreating prevented this. Finally the female did not retreat, and when another attempt was made mounted the back of the male, elevated her head in a curious attitude against a point about two-thirds from the base of his tegmina, and copulation followed, but lasted for a very short time, two or three seconds. The female then mounted his back farther and began to feed on the glands that are situated just back of the base of the hind wings. It seemed that she tired of this every few minutes, for she would run off a little way and the male would pursue her, singing, and, by pushing his abdomen under her, persuade her to continue. Sometimes the female would return of her own accord. This alternation of feeding or biting on the glands of the male continued for about thirty minutes, when I left them. When I returned they had disappeared. In other pairs I have seen it terminated by the female running away altogether. It very likely lasts for an hour or more, and possibly always follows copulation. What the nature of the glandular secretion is, if there is such, I do not know, and why the male so sedulously pursues the female to induce her to feed upon them is another puzzle. This feeding on the glands I have also noticed in *O. niveus*, and the performance was the same. In this insect it occurs at night, and may be observed by means of a lantern. After you become familiar with cricket notes you can generally tell whether pairing is going on, because the notes of the male are changed. This is true of the Nemobiids or Ground Crickets, the Gryllids or Field Crickets, and the Oecanthids or Tree Crickets. The nocturnal crickets, such as *O. niveus*, that pair and oviposit at night are curiously inattentive to artificial light, and will continue their operations with a bright acetylene lamp within a foot of them.

Blatchley asks this question with regard to the feeding of the female of *O. fasciatus* on the dorsal glands of the male: "Is it possible that in the mating of these Oecanthids the female removes the semen from the

glands, whose openings are beneath the tegmina of the male, and then fertilizes her ova?"

Dr. Howard, in his "Insect Book," says with reference to *O. niveus*: "Harrington has watched one of the concerts closely, and says, 'An interesting feature of its concerts is one of which I have not been able to find any mention in books accessible.' While the male is energetically shuffling together his wings raised almost vertically, the female may be seen standing just behind him, and, with her head applied to the base of the wings, evidently eager to get the full benefit of every note produced." The observer mentioned, no doubt, found the insects after pairing and while the female was feeding on the glands. When rather suddenly approached she will cease gnawing and sit perfectly still, while the male may continue singing until she begins again.

The tree-crickets in appearance, in graceful flight, in song and in general habits certainly are worthy of the place that they occupy systematically at the head of the Orthoptera. They are the aristocrats, the accomplished gentlefolk of the Order.

A NEWPORTIA IN UTAH.

BY RALPH V. CHAMBERLIN, PROVO, UTAH.

The Chilopod genus *Newportia* was erected in 1847 by Gervais for the species *Scolopocryptops longitarsis* of Newport, a form now known to occur in Cuba, St. Vincent, Central America, Colombia, Venezuela, and Brazil. Since that time some fifteen additional species belonging to the genus have been described, all of them from the region within the tropics of America, the general range of the genus corresponding roughly with that of the type species. It was, consequently, a matter of no little interest to find an individual representing a well-defined species of this genus as far north as Salt Lake City. Most of the species are thus far known from one or from but few individuals.

The genus *Newportia* belongs to the Cryptopinæ, the lowest of the three subfamilies of the Scolopendridæ. In common with the other genera of this subfamily eyes are absent in *Newportia*, and the tarsi of all the ambulatory legs, excepting the last two, consist each of but a single segment, the under surface of which bears a spine or a row of bristles. From the other genera of the Cryptopinæ, *Newportia* may be readily distinguished through the presence of twenty-three pairs of ambulatory legs,

of which the last have become peculiarly specialized, having the tarsi slender or thread-like, and divided into a large number of short segments, being antenniform rather than like ordinary legs. Claws are normally absent from these last tarsi; but an individual has been found in which claws are present, this case probably representing an atavism to the more general Cryptops-like form from which specialization has proceeded in the group. In *Newportia* there are no teeth on the inner side of the femora of the prehensorial or poison feet. All the dorsal plates are marked with two impressed longitudinal lines or furrows, one each side of the middle, while on most of the plates there is outside of each of these an oblique furrow. The first dorsal plate is characteristically marked with a transverse furrow, which in most species is angularly bent backward at the middle. In some species the plate is distinctly depressed into a pit at this angle in the cervical line or furrow. In about half of the known species the two median furrows of the first dorsal plate bifurcate, the two inner of the diverging branches running inwardly and forward and meeting at the middle angle of the cervical line. A W-shaped mark is thus formed. (See Fig. 2.)

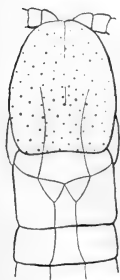


FIG. 2.—*Newportia Utahensis*: dorsal view of head and anterior segments.

The species of *Newportia* found in Utah is clearly most closely related to *Newportia azteca*, Humb. and Sauss. (*spinipes*, Poc.), the species ranging nearest it geographically. These two species differ from all the others with the W marking on the first dorsal plate, in having two spines at the distal end of the tibial joint of the legs, and in having at the same time a ventral spine below the apex of the tarsal joint. The Utah species differs from *azteca*, among other points, in the shape and proportions of the head plate and in the greater length and different disposition of its posterior furrows; in lacking dental plates, and in not having the anterior border of the presternum mesally deeply

excavated; in having the last ventral plate more narrowed posteriorly, and its posterior margin but slightly incurved; in having the pseudo-pleura of the last segment covered with numerous spinules, both laterally and ventrally, among the pores, as well as along the posterior margins and over the basal portion of the posterior processes; and in the form and size of the spiracles.

Newportia Utahensis, new species.—Head longer than wide, its sides converging a little posteriorly and more strongly anteriorly from the middle; marked with a median longitudinal furrow extending from the anterior, slightly indented margin, posteriorly about one-fourth the length of the plate, and with a second short median furrow just back of the middle; the paired furrows on the posterior portion of plate beginning near the middle and first converging and then diverging to the posterior margin, evenly curving; finely punctate.

Antennæ with the usual seventeen articles, the first four of them sparsely clothed with relatively long bristles, the other articles subdensely clothed on their outer surfaces with short setæ.

Presternal plate punctate, its anterior margin on each side sub-straight, the margins of the two sides meeting in the middle at a slightly re-entrant angle; no median excavation.

First dorsal plate with the transverse or cervical furrow evenly curving, a little angulate at the middle; a depression or pit at the angle of the cervical furrow; the paired furrows bifurcating, the inner branches uniting at the angle in the cervical furrow, and forming thus the typical W-shaped impression.

The longitudinal furrows on the second dorsal plate conspicuously diverging from the anterior to the posterior margin.

The oblique, shallow lateral furrows are distinguishable from the third plate posteriorly.

The last dorsal plate with its posterior margin gently convexly rounded and slightly indented at the middle; without a median furrow.

Ventral plates finely and subdensely punctate; each with a distinct and scarcely abbreviated and distinct, fine submarginal furrows.

Last ventral plate with the sides sub-straight or a little convexly rounded; strongly narrowed posteriorly; the posterior margin but slightly incurved.

Basal segments of the ambulatory legs spinulose; the tibia armed at distal end with a conspicuous ventral spine, as well as with a second somewhat stouter spine dorsal or dorso-lateral in position; tarsal joint with a ventral spine below the distal end.

Pseudopleura of last segment with their posterior processes conical in shape, apically subobtuse; posterior margin above and laterally from the processes with a close row of short spines, which also cover the basal portion of the processes; similar short spines occurring over the entire

pseudopleura, both laterally and ventrally, among the numerous small pores.

Spiracles moderately small, mostly obliquely suboval.

The head and last five segments brown, a little paler beneath than above; elsewhere the body yellow, the anterior segments being darkened a little; legs pale yellow; antennæ light brown proximally, becoming yellow distally.

Length, 21 mm.

Locality: Warm Springs, Salt Lake County, Utah (May, 1908).

HEMIPTERA: NEW AND OLD.—NO. I.

BY G. W. KIRKALDY, HONOLULU, HAWAIIAN ISLANDS.

Fam. Aradidæ.

1. *Aradus montivagus*, nom. nov., = *planus*, Fabricius, 1803 (not of the same author, 1794).

Fam. Lygæidæ.

2. *Acanthocephala nasula* (Say) =|| *femorata* (Fabricius).
3. *Cletus signatus*, Walker, 1871, =|| *bipunctata* (Westwood, 1842).
4. *C. bipunctatus*, H.-S., 1840, = *pugnator*, Lethierry & Severin, 1894, = *armatulus*, Breddin, 1905.

C. pugnator was merely a misidentification of a Fabrician species, and was, moreover, unaccompanied by a description.

5. *Arenocoris*, Hahn, 1834, = *Pseudophloeus*, Burmeister, 1835, = *Spathocera*, Stein, 1860.

Pseudophloeus was proposed to supersede *Arenocoris* because the latter was, etymologically, a hybrid; it therefore must take the same type.

6. *Ulmicola*, nom. nov., = *Arenocoris*, Fieber, 1860, type *spinipes*.
7. *Coriscus Stalianus*, nom. nov., =|| *Alydus dentipes*, Stal, 1868, Svensk. Vet. Handl., 7, No. 11, p. 65.

8. *Merocoris*, Perty, 1833 (not 1830).

Coriomeris, Westwood, 1842, =|| *Merocoris*, Hahn, 1834 (not 1831).

[Fam. Cimicidæ: *Plisthenes*, =|| *Merocoris*, Burmeister, 1834.]

9. *Riptortus nipponensis*, n. n., 11-clavatus, Thunb., 1783, = 11-annulatus, Uhler, 1860.

10. *Boudicca*, nom. nov., = *Pseudophloeus*, Auctt., type *Fallenii*.

Fam. Pyrrhocoridae.

11. *Pyrrhocoris*, Fallén, 1814, = *Astemma*, Lepeletier & Serville, 1825; type *apterus*. Lepeletier & Serville included three species in their genus at its inception, but the first, *apterus*, is the only one mentioned in the generic description, where it is cited as the only one whose habits are known.

Fam. Myodochidae.

12. *Oncopeltus Bergianus*, nom. nov., = || *Stalii*, Berg, 1883.
 13. *Stalagmostethus sinensis* (as var. of *venustus*) (Reuter, 1888), = || *cruciger*, Motshulsky, = || *marginatus*, Jakovler, = || *elegans*, Distant, = *jakowleffi*, Lethierry & Severin.
 14. *S. neotropicalis*, nom. nov., = || *dispar* (Stal).
 15. *S. furcula* (H.-S., 1850), = || *festivus* (Thunberg).
 16. *S. melanesicus*, nom. nov., = || *mactans* (Stal), = || *ruficeps* (Walker).
 17. *Artheneis*, Spinola, 1837 (type *eymoides*), = *Nysius*, Dallas, 1852.
 18. *A. helvetica* (H.-S., 1850), = *lineata* (Costa, 1852).
 19. *Heterogaster semicolon*, Fieber, 1837, = *affinis*, H.-S., 1838.
 20. *Oxycarenus pallens*, H.-S., 1850, = *collaris*, Mulsant & Rey, 1852.
 21. *Tyrrheneis*, gen. nov., = *Artheneis*, Auctt. (type *foveolata*).
 22. *Orthæa neotropicalis*, nom. nov., = || *serripes* (Fabricius).
 23. *Rhyparochromus maculipennis*, Curtis, 1836, = *prætextatus*, H.-S., 1837.

Reuter has already pointed out that *Budæus*, Distant, was founded on nymphs (mistaken for short-winged adults !). I think that *B. brevipennis*, Distant, is the final nymph of *Orthæa pallicornis* (Dallas); the long fourth segment of the antennæ was evidently missing.

24. *Critobulus*, Distant, is also probably the nymph of a *Dieuches*.
 25. *Ischnorhynchus truncatulus*, Walker, var. *Horvathiana*, nov., = || *geminatus*, Fieber.

Fam. Gerridae.

26. *Velia Osborniana*, nom. nov., = || *brunnea*, Osborn, 1904.

Fam. Reduviidae.

27. *Apiomerus incisus*, H.-S., 1846, = *geniculatus*, Erichson, 1848.
 28. *A. rubricinctus*, var. *Stalianus*, nov., = || *geniculatus*, Stal.
 29. *Coranus neotropicalis*, nom. nov., = || *bimaculatus* (Fabricius).
 30. *Harpactor xosanus*, nom. nov., = || *tibialis*, Stal.
 31. *Isocondylus pungens*, H.-S., 1846, = || *elongatus*, Lepeletier & Serville.
 32. *Notocyrtus flavolineatus*, Stal, = || *dorsalis* (Gray).

33. *Patago patagonicus*, nom. nov., =|| *obsoletus* (Blanchard).
 34. *Phemius tuberculifer*, Stal, =| *tibialis* (Westwood).
 35. *Peirates niger*, H.S., 1835, = *unicolor*, H.S., 1836, = *strepitans*, Rambur.
 36. *Plocogaster gesana*, nom. nov., =|| *geniculatus*, Lepeletier & Serville.
 37. *Reduvius osiris*, nom. nov., =|| *dorsalis*, Stal.
 38. *Spiniger Lepeletierianus*, nom. nov., =|| *ater* (Lepeletier & Serville).
 39. *S. circumcinctus*, nom. nov., =|| *limbatus* (Lepeletier & Serville).
 40. *Zelus speciosus*, var. *agavis*, Blasquez, 1870, = var. *Stolli*, Lethierry & Severin, 1896.

Fam. Miridæ.

41. *Calocoris neotropicalis*, nom. nov., =|| *bimaculatus* (Fabricius).
 42. *Liocoris tripustulatus*, var. *picta*, Hahn, 1833, = var. *autumnalis*, Reuter, 1875.
 43. *Reada Mayri*, White, 1878, = *Reuda Mayrii*, Atkinson Cat., 107.
 44. *Phytocoris helveticus*, nom. nov., =|| *albofasciatus*, Fieber.
 45. *Resthenia menanochra*, H.S., 1846, = *melanochra*, Auctt.
 46. *Saturniomiris papuanus*, nom. nov., =|| *tristis* (Walker).
 47. *Tichorhinus pelagicus*, nom. nov., =|| *Orthotylus mutabilis*, F. B. White, 1878.

Fam. Issidæ.

48. In Bull. Haw. Plant. Ent., I, 440 (1906), I stated that the description of *Issus decipiens*, Spinola, was unknown to me. Melichar (1906, Abh. zool. bot. Ges., Wien, III, No. 4, p. 156) cites it as 1839, A. S. E., France, VIII, 3, but could not have referred to the original, as it certainly is not there. I suspect that the correct reference will be found in Gay's "Chile" (1852).
 49. *Hemisphærius bipunctatus*, var. *rufomarginata*, nov., =|| *viridis*, Melichar.

Fam. Poekillopteridæ.

50. *Euricania jo* (Boisduval, 1835), = *oculata* (Guérin, 1838).
 51. *Mindura sundana*, nom. nov., =|| (*fusca*, Fabricius, 1794).
 52. *Ormenis antillarum*, nom. nov., =|| *quadripunctata* (Fabricius).
 53. *O. insulicola*, nom. nov., =|| *pygmæa* (Fabricius).
 54. *Neomelicharia amoena* (Walker), =|| *pustulata* (Donovan).

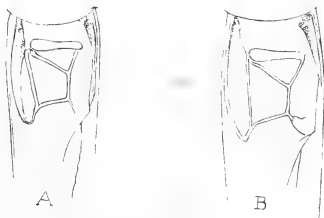
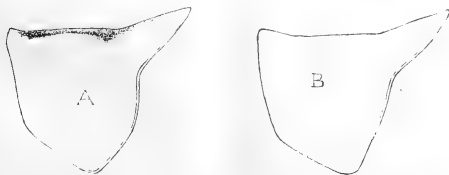
Fam. Tetigoniidæ.

55. *Stictodepsa neotropicalis*, nom. nov., =|| *fusca* (Fabricius).
 56. *Euaëanthus interstinctus* (Fallén), =|| *acuminatus* (Fabricius).

A NEW ORCHELIMUM FROM NEW JERSEY.

BY WM. T. DAVIS, NEW BRIGHTON, STATEN ISLAND, N. Y.

Early in September, 1908, I visited Dennisville, N. J., with Mr. Frank E. Watson and Mr. Wm. P. Comstock, making a general collection of insects. Among the captures were two male specimens of a highly-coloured species of *Orchelimum*. They were found on the tall grasses in a very wet swamp. Later in the month, while near Helmetta, N. J., an *Orchelimum* was heard singing a *zip, zip, zip—z, z, z,—zip, zip, zip—z, z, z*, quite a distinguishable song from that of *O. vulgare*. The songster was discovered to be the same highly-coloured species that we found at Dennisville. Near-by a female was found, and later other males. Mr. John A. Grossbeck has also taken this insect at Trenton, N. J.

FIG. 3.—A, *Orchelimum pulchellum*; B, *O. nigripes*: shrilling organs.FIG. 4.—A, *Orchelimum pulchellum*; B, *O. nigripes*: side view of thorax.

While this species resembles *Orchelimum nigripes*, Scudder, it is certainly distinct, being differently coloured, and having other characters, as may be seen from a series of both species. The name *Orchelimum pulchellum* is proposed for this beautifully-coloured insect. Mr. Louis

January, 1909

H. Joutel has kindly made for me some sketches of the shrilling organs and side-views of the thorax of both *nigripes* and *pulchellum*, whereby it will be seen that the right-hand nerve in *pulchellum* (A, Fig. 3) is straighter than the same nerve in *nigripes* (B, Fig. 3). A series further shows that the lower angles of the thorax are more rounded in *pulchellum* than in *nigripes* (A and B, Fig. 4).

In *pulchellum* the face is yellow, top of head and often along sides red, sometimes quite bright in colour. Thorax with the usual dorsal dark stripe, but darker than in *nigripes*. Sides bottle-green, under parts yellowish. Abdomen: dorsum dark, sides green, under surface a bright lemon-yellow, edged with brown. Legs: femora of first and second pair lemon-yellow on the inner surfaces, greenish on the outer; femora of hind pair lemon-yellow, with the apical half or third reddish. Tibiæ of all of the legs reddish, the tarsi darker. When seen in life the insect is particularly beautiful, and is conspicuous for its bottle-green coloured tegmina, with a bluish tinge, its lemon-yellow markings and its reddish legs. The ovipositor is much curved, and in the type red in colour. The hind femora are each armed with from three to five spines on the under side.

Measurements.—Male: Length of body, 19 mm.; of pronotum, 5 mm.; of tegmina, 20 mm.; of hind femora, 16 mm. Female: Length of body, 20 mm.; of tegmina, 22 mm.; of hind femora, 18 mm.; of ovipositor, 9 mm.

TWO ADDITIONS TO THE LIST OF BUTTERFLIES OF THE ISLAND OF MONTREAL.*

BY ALBERT F. WINN, WESTMOUNT, P. Q.

One of the great attractions of collecting Butterflies and Moths lies in the probability of coming across, at any moment, something new to the locality in which one is working, even though common elsewhere.

Although the district about Montreal has been fairly well worked over since the formation of the Montreal Branch of the Entomological Society of Ontario, 35 years ago, not a season passes in which we do not find some moths, large or small, not previously observed and recorded. But finding a new butterfly is a different matter, and it was indeed a pleasant surprise when I came across a specimen of the little pepper-and-salt skipper, *Amblyscirtes samoset*, Scudder, flying over a very muddy field at

* Read at the Annual Meeting of the Entomological Society of Ontario, Nov. 6, 1908.

January, 1909.

Pt. aux Trembles, near the Rifle ranges, on June 7th, and a few minutes later I took another. My companion also wanted some, and a thorough search was made, resulting in Mr. Chagnon also capturing one in an adjoining field. The species is apparently commoner to the North among the Laurentian Mountains, where I have taken it at Montfort and St. Faustin, and also at Calumet, on the Ottawa River—always in early June.

A month later, July 12th, while walking across the Westmount Golf Links, with Mr. A. R. M. Boulton, of the Quebec Branch, a small yellow butterfly passed us, which looked like a very much undersized *Colias philodice*. My net was not ready, so my companion offered to catch it for me if I wanted it, but as the day was very warm I said not to chase it, as it would probably come back, but it kept straight on. We went the opposite way, to the Nun's Woods at Cote St. Luc, to look for *Haploa confusa*, Lyman, and were busy catching a series of these moths, when another of the little yellow butterflies came along. I was ready this time, and in a moment secured the first specimen of *Terias lisa*, Bd. and Lec. (The little Sulphur, Holland aptly calls it), that I had seen alive. Another soon appeared in the same place, and Mr. Boulton captured it. As we were close to a fine field of clover, we thought the butterflies were probably coming from it, and therefore turned our attention to it, but without seeing any more. We resumed our raid on the Haploas, going further into the woods, where *H. confusa* was scarcer, and *H. Lecontei* more likely to be found. We were again lucky, for in coming out of the woods on the west side into a small cedar swamp, another *Terias lisa* was flitting about, which I easily caught. As no more were visible, we adjourned to Cartersville for lunch.

TWO NEW BEES.

BY T. D. A. COCKERELL, BOULDER, COLO.

Nomada antonita, n. sp.

♂.—Length about 7 mm.; robust, the abdomen broadly oval; black, with cream-coloured markings; the thorax without red. Vertex and mesothorax very densely punctured; face very broad, with appressed silvery hair, not hiding the surface; the low and broad clypeus, very large triangular lateral marks (strongly indented opposite the antennæ), the base of the mandibles and a narrow stripe along the posterior orbital margin (except

the upper fifth) all cream coloured ; *no supraclypeal mark* ; mandibles simple ; labrum with the upper third cream-colour, the rest ferruginous ; lateral marks ending about the upper level of the antennal sockets, but there is a short reddish-yellow stripe higher up near the eye, and a minute dot at the summit ; *scape bright ferruginous, not much swollen* ; flagellum stout, dark fuscous above and bright ferruginous beneath ; *third antennal joint conspicuously longer than fourth*. Mesothorax and metathorax entirely black, the base of the latter dull and granular ; upper margin of prothorax, tubercles, tegulae, large irregular mark on pleura, scutellum and postscutellum, all cream-colour ; wings clear, stigma ferruginous, nervures fuscous ; first r. n. reaching second s. m. beyond middle ; b. n. meeting t. c. ; legs ferruginous, with the knees, anterior and middle tibiae in front, hind tibiae in front at base and apex, and large area on hind coxae, all cream-colour ; *anterior coxae without spines*. Abdomen very minutely but strongly and closely punctured ; first segment black, with a broad ferruginous band, at each side of which is a small yellow patch ; segments 2 to 6 each with a very broad creamy-white band, occupying most of the surface, but much constricted in the middle on second ; hind margins and extreme bases of these segments black ; *apical plate broad, truncate with rounded corners, quite entire* ; ventral segments, except the first, almost entirely creamy-white.

Hab.—Antonito, Colorado, Aug. 5, 1900 ; from the Colorado Agricultural College.

In my tables of Rocky Mountain *Nomada* this species runs out at 36. In appearance, however, it suggests the subgenus *Micronomada*, from which it differs by the spineless anterior coxae. It is a very pretty and distinct little species.

Bombus hyperboreus Albertensis, n. var. (vel. n. sp.?).

♀.—Length about 19 mm. ; width of abdomen 8 ; ocelli small, as in *Bombus*, s. str. ; clypeus shining, convex, with sparse punctures of unequal sizes, some very faint ; malar space about one-fourth broader than long ; upper outer face of mandibles with three strong ridges ; labrum with a pair of widely-separated transversely oval bosses ; flagellum short, third antennal joint about as long as 4 + 5 ; mesothorax densely punctured, except in middle, where it is smooth and shining ; hair of head black, of thorax in front, pleura and scutellum, tawny-yellow, but a very broad black band between the wings ; wings strongly reddened, a dark cloud at apex

of marginal cell ; abdomen rather narrow, with coarse black hair, except on first segment and anterior middle (tapering laterally) of second, where it is tawny-yellow ; hair of legs black, spinules on tarsi ferruginous.

Hab.—Calgary, Alberta, British America (*F. H. Wolley Dod*).

The coloration of the abdomen is as in *B. separatus*, which, however, is a *Bombias*. The insect is probably a race of *B. hyperboreus grænlandicus*, (Smith), but it has the yellow on the abdomen reduced. It is also related to *B. pleuralis*, Nyl., which Friese makes a subspecies of *B. Kirbyellus*, Curtis.

A REMARK ON THE IGNOTUS ÆNIGMATICUS.

BY PHILIPP ZAITZEV, ST. PETERSBURG, RUSSIA.

With special interest I read in the pages of this journal, 1908, No. 7, a paper by Mrs. A. T. Slosson, "A Bit of Contemporary History," treating of the habits of one of the most peculiar and interesting representatives of Coleoptera. Nearly all the past year this minute creature attracted my attention, being an uninvited guest at my home. Some of my observations and considerations about this subject I hope to expose on the pages of *Revue Russe d'Entomologie* in the next issue ; at present I will confine myself to the remark that this mysterious stranger of my esteemed entomological colleague is, properly speaking, a very old friend of ours, described and figured in 1839 by V. Motschulsky (*Bull. Soc. Nat. Moscou* xii., page 76, t. v.; f. 1-6), from Transcaucasia, under the name of *Thelydrias contractus*. Afterwards this species (without doubt identical will *Ignotus ænigmaticus*!) was described by Reitter from specimens from the Transcaspian Province and Turkestan, and placed by him, very unfortunately, in the group of Driloris (family Cantharodidæ). *Bestimm ; Tabelle d'Europ. Coleopt.*, XXIX., 1894.

TO WHOM IT MAY CONCERN :

Subscribers to the CANADIAN ENTOMOLOGIST are reminded that the fee for 1909 is now due, and should be paid to the Treasurer of the Entomological Society, Guelph, Ontario, forthwith. Remittances may be sent by post-office or express money order, but personal cheques on local banks are not acceptable, as it costs from 10 to 25 cents to get them cashed. As a rule, the magazine is sent until ordered to be discontinued, so that regular subscribers may not suffer any inconvenience.

NOTES ON THE FORMS OF *RUSTICUS ACMON* (DB.-HEW.),
SCUDDER, OCCURRING IN THE VICINITY OF
PASADENA, CALIF.

BY VICTOR L. CLEMENCE, PASADENA, CALIF.

For some time the writer has made a special study of the different forms of *Rusticus acmon*. This special work has resulted in the possession of large series of four distinct forms.

From Boisduval's description of *R. antegon* (which he admits is the same as *R. acmon*), and by comparison with Doubl.-Hew., Plate 76, fig. 2, also with specimens from Boisduval's type locality, "les environs de San Francisco," I have decided which of these forms is typical. I may also add that Strecker's description in "Lepidoptera: Rhopaloceres and Heteroceres, indigenous and exotic," also describes this form.

Careful observations made during the last two seasons show that of the other three forms two are seasonal, while the other is a new subspecies occurring only in the mountains at an altitude of not less than 3,000 feet, and frequenting only *Eriogonum fasciculatum*, which is probably its food-plant, while that of the other forms is *Hosackia glabra*, generally admitted to be the food-plant of true *acmon* or *antegon*.

The new subspecies, which I have named *Rusticus monticola*, is a much finer butterfly than *acmon*, being larger and more brilliantly coloured. Of the remaining two forms, one occurs from February to April, is small in size, of a darker blue than the type form, and heavily margined in black, which leads me to think that the imagoes are produced from pupæ which have hibernated. The remaining form appears about May the 9th, is larger than the preceding, resembling the type form, only is larger, and has not such a pronounced violet tinge.

The writer realizes the value and necessity of applying the test of breeding in order to correctly classify these different forms, but owing to daily observations and also the valuable help which he has received from Mr. Fordyce Grinnell, Jr., feels assured that his deductions would be fully justified by the above-mentioned test. From the length of time that *acmon* is on the wing, from February till October, it may safely be assumed that there are at least three broods; therefore, these different forms are probably seasonal, as previously stated.

Rusticus monticola, n. subsp.—The type, 2 ♂♂'s, 2 ♀♀'s, are taken from a series of 21 insects in the author's collection.

January, 1909

Male.—Expands 28-31 mm. Upper side of primaries bright silvery-blue, with heavy black marginal border. No discal spot. Secondaries bright silvery-blue, with very narrow black marginal border. There is a row of five black dots separated from ground colour by heavy red crescents extending along the marginal border. The general colour of under side is ash gray, flushed with bluish scales. The markings are the same as *acmon*, only much heavier and more distinct. All wings fringed with white.

Female.—Expanse 30-35 mm. Upper side of primaries bright blue, with black discal bar. The outer half of wing is taken up with a broad black band, which fades into ground colour towards base. Secondaries same as male, only red crescents are twice as wide, occupying nearly one-third of the wing. Ground colour of under side brownish-gray, markings very heavy and pronounced, as with the male.

The females appear to vary considerably. Some have the red crescents continued on primaries. Another specimen in my series has a marginal row of white spots on primaries. I have never come across these variations among true *acmon*, though I have examined hundreds of specimens from different localities.

A comparative table of *R. acmon* and *R. monticola* reads as follows:

MALE.

<i>R. acmon.</i>	<i>R. monticola.</i>
Expanse, 25-27 mm.	Expanse, 28-31 mm.
Ground colour <i>violet-blue</i> .	Ground colour <i>silvery-blue</i> .
Marginal band primaries <i>narrow</i> .	Marginal band primaries <i>broad</i> .
Red crescents on sec. <i>indistinct</i> .	Red crescents on sec. <i>very pronounced</i> .
Markings on under side <i>distinct</i> .	Markings on under side <i>very heavy</i> .

FEMALE.

Expanse, 21-26 mm.	Expanse, 30-35 mm.
Ground colour <i>dark brown</i> .	Ground colour <i>silvery-blue</i> .

Other differences same as in the male.

THE ANNUAL REPORT of the Society to the Legislature of Ontario is now in the printers' hands, and will probably be ready in March. It is distributed by the Department of Agriculture at Toronto, and will only be sent to those whose subscription for 1909 has been duly paid.

BOOK NOTICE.

MANUAL OF NORTH AMERICAN DIPTERA, by Samuel W. Williston. Third edition, illustrated; 405 pages.—James T. Hathaway, 297 Crown Street, New Haven, Conn. (Price \$4.00, postpaid.)

During the last twelve years the earlier edition of this work has been found most useful by professional Entomologists, whether engaged in teaching or in economic work, and has served as a daily handbook for the few students of the order. To all of these it must be a source of much gratification that the author has been enabled to complete this comprehensive and excellent manual, which will be no small help to them in their work. The assistance that it will render to all who attempt to study the Diptera of North America is so great that it should lead many to devote themselves to the investigation of the much neglected but highly important Two-winged Flies.

The present edition contains definitions of about twelve hundred genera, being all that are known from North and Central America and the West Indies, with the exception of a few doubtful forms; more than half of these genera are more fully defined by means of nearly a thousand photographs and carefully drawn figures, which are an immense help in the determination of forms. Of sixty-one families synoptic tables are given, preceded by a table of the families themselves. By means of these and the explanatory figures, a student should be able, after a little practice, to "run down" to its genus any fair-sized fly, and after gaining experience in this way to enter upon a careful scientific study of any family to which his attention may particularly be drawn. The Introduction deserves to be read by all Entomologists, who will find the observations and advice contained in it of great interest and much value. This is followed by a series of chapters on the structure of the various parts of the insects, the head and its organs, the thorax, legs, wings, etc., and the vestiture, which is of so much importance in the differentiation of many forms.

The author has been assisted in his work by all the well-known North American Dipterists, few in number though they be, and he and they are to be congratulated upon the completion of a work which should give an immense impetus to the study of this difficult order. A copy of the book should certainly be in every scientific library, and no professional Entomologist can afford to be without it.

Mailed January 7th, 1909.

The Canadian Entomologist.

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No. 2.

PHYLLAPHIS COWENI, CKLL. (Plate I, Figures 1 to 6).

BY C. P. GILLETTE, FORT COLLINS, COLORADO.

Aphid. Cowen : Bull. 31, Tech. Ser., Colo. Ex. St., p, 125, 1895.

Pemphigus Coweni, Cockerell, CAN. ENT., XXXVII, p. 391, 1905.

Mr. Cowen being unable to place this louse in a genus known to him, did not attach a name to it, though his descriptions of both gall and louse make it certain that he was studying the species under consideration.

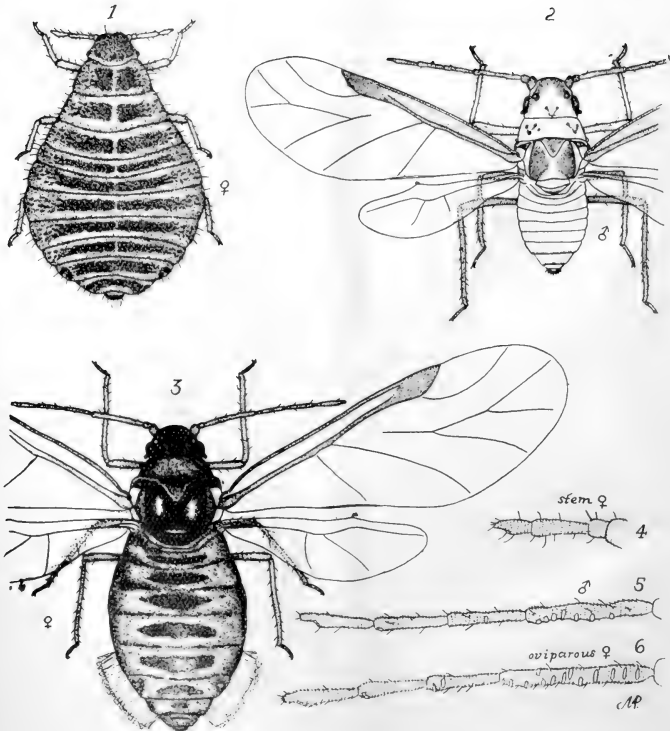
The louse has the general appearance and habits of a *Pemphigus*, and was so placed by Prof. Cockerell, who saw only the apterous form and pupæ. On Aug. 5th, 1908, the writer was in the foothills a few miles west of Fort Collins, at an altitude of about 8,000 feet, where Bearberry (*Arctostaphylos uva-ursi*), the host-plant of this louse, grows in great abundance. Apparently every plant was infested, as was evident from the numerous pod-like leaves that were conspicuous everywhere. The galls are formed by about one-third of the leaf surface folding lengthwise upon the other two-thirds, inclosing the lice and becoming swollen so as to resemble minute pea-pods. If the galls were beneath leaves so as to be shaded, they were green in colour, but if exposed to the sun they were more or less deep red in colour. The galls varied between 10 and 20 mm. in length.

Many apterous lice, including stem-mothers, and numerous pupæ, were present in the galls, but no adult alate forms were seen, and apparently all the lice, except stem-mothers, were to become winged. Syrphus larvæ were common in the galls.

Plants bearing galls were taken and placed in the insectary, where syrphus flies and great numbers of the alate viviparous females, alate oviparous* females and alate males were reared. These I have described below.

A glance at either of the alate forms figured in the accompanying plate will be sufficient to see that this can not be a *Pemphigus*, as the fore wing has the cubital vein with two forks, when it should have none. I

*This is the only species, except in *Chermes*, where I have seen alate oviparous females.



PHYLLAPHIS COWENI, GILLETTE.

have therefore placed the species in the genus *Phyllaphis*, where it seems more nearly to belong.

It seemed as though the stem mother must be the immediate parent of all the colony in each gall, but she probably was mother of the viviparous alate females only, and these probably gave birth to the true sexual forms.

Stem-mother : Plate I, figs. 1 and 4.

General colour varying with age, the older specimens being darkest. The light-coloured specimens are dull sordid yellow, with transverse broken bands of very dark olive green over a large portion of the abdomen. The older and darker specimens appear almost entirely black. The head, antennæ, entire legs, including coxæ, and genital plates, dark brown to blackish in colour. The legs and antennæ are very short and stout. The femora of the hind legs do not exceed in length joints 3 and 4 of the antennæ combined. General shape of the body stout pyriform, the older specimens being very much truncated posteriorly. Length varying from 1.25 to 1.50 mm.; width varying little from 1 mm.; joints to the antenna four; the 4th joint having an unguis which is about half as long as the short 4th joint; joint 3 a little less than half the whole length of the antenna. There are no visible sensoria except one at the base of the unguis, and I cannot make out any transverse annulations upon joints 3 and 4 except as indicated by minute stout hairs arranged in transverse rows.

The body is sparsely set with rather stout hairs; the entire surface above and the antennæ are also closely set with very short stout hairs, giving it a velvety appearance; vertex convex, slightly bilobed; cornicles very slightly raised above the surface, located about midway on the 6th segment, and surrounded by a dark area; cauda subobsolete; beak just attaining middle coxæ. In dark specimens of the louse the cornicles are often difficult to see.

Pupa.

Very light to dark green in colour. In each gall there are a few pupæ smaller and lighter coloured than the others, which I take to be the males. Wing-pads of the female pupæ blackish; length of female pupa before last moult 1.80 to 2 mm.; antennæ 6-jointed, joint 3 longest and about equal to joints 4 and 5 together.

Alate Oviparous Female : Plate I, figs. 3 and 6.

General colour of body dark olive green, with head and lobes of

mesothorax black ; beneath, the colour of the abdomen is a light olive green ; the antennæ and legs are dusky brown to blackish ; on either side of the abdomen, opposite the cornicles and beneath the lateral margins of segments 5, 6 and 7 is a heavy tuft of white cottony secretion. This cottony secretion, apparently, is not formed on any other portion of the body, or by any other of the lice. Length of body 1.50 to 1.70 mm.; length of wing 2 mm.; antenna varying from .65 to .85 mm.; third joint longest and almost exactly equal to joints 4 and 5 combined ; joint 6 with its short unguis equal to or slightly longer than either joint 4 or 5. As in case of the stem-mother, the joints are distinctly covered everywhere with very short stout hairs or points. On the terminal joints these minute points are arranged in more or less distinct annulations. Joint 3 has about 15 transverse tuberculate sensoria ; joint 4 two to five similar sensoria ; legs distinctly shorter than in the viviparous form, the hind tibiæ measuring only about .51 mm. in length ; vertex quite convex ; cornicles slightly raised above the surface, somewhat more prominent than in the stem-mother ; cauda broadly rounded, scarcely elevated ; anterior wings with three transverse veins, the third transverse vein being twice forked ; the branch forming the second fork arises about midway between the first fork and the tip of the wing ; stigmal vein moderately curved ; stigma transparent, very short and hardly longer than broad ; posterior wing with two cross nervures ; both wings hyaline ; beak just attaining second coxæ.

Lice that emerged during the night began depositing eggs by noon of the following day.

Viviparous Female.

Differs from the oviparous form in having the legs longer ; tibiæ of hind legs measuring about .68 mm. This form also lacks entirely the waxy secretion which forms upon the sides of the venter on joints 5, 6 and 7 in the oviparous form.

Alate Male : Plate I, figs. 2 and 5.

The male is much smaller than the females, and the general body colour is light yellow. The compound eyes and the sides of the head in front of them are black. The lobes of the mesothorax and scutellum are dusky brown to black. In most specimens a distinct dusky V-shaped spot occurs upon the dorsum of the head and one near either lateral margin of the prothorax. Antennæ and legs dusky yellow. Darker specimens have the head largely dusky brown, and the antennæ and legs dusky

or with very little yellow showing. Length of body, .80 mm. to 1 mm.; vertex rather sharply rounded; length of wing, 1.60 mm.; length of antennæ, .80 mm.; joint 3 longest, joints 4 and 5 equal; joint 6, with unguis, of the same length as the two preceding joints; joint 3, with about seven and joint 4 with about one transverse sensoria.

DESCRIPTION OF PLATE.

Phyllaphis Coweni, Ckll.—1, stem-mother; 2, male; 3, oviparous female; 4, antenna of adult stem-mother; 5, antenna of male; 6, antenna of oviparous female. M. A. Palmer, artist.

Figures 1, 2 and 3 are enlarged 30 diameters, and figures 4, 5 and 6 80 diameters.

THE PREPARATORY STAGES OF EUCHLOË SARA, BOISD.

BY KARL R. COOLIDGE AND ERLAL J. NEWCOMER, PALO ALTO, CALIF.

Euchloë sara, with its variety *Reakirtii*, Edwards, is a common and early butterfly in California, flying in the open fields about wild mustard (*Brassica*) and other crucifers. *Reakirtii* may sometimes be seen as early as February, and later, in April and May, *sara* appears, continuing on the wing until October. *Sara* is one of the early Californian pioneers, having been described by Dr. Boisduval in 1852.¹ In 1869 W. H. Edwards² described *Reakirtii*.

Synonymy and Distribution.—*Sara*, with its so-called varieties, is distributed almost everywhere west of the Rocky Mountains, from Arizona to Vancouver. As shown by Edwards (CAN. ENT., XXIV, p. 52), *sara* proceeds from eggs of *Reakirtii*, although some of the pupæ may go over and produce *Reakirtii* in the spring, the dimorphism being that of *Papilio ajax*. *Thoosa*, Scudder, is a synonym of *julia*, Edwards, and *flora*, Wright, and *mollis*, Wright, are but slight modifications of *sara*. *Brown-ingii*, Skinner; *stella*, Edwards, and *julia*, Edwards, we would consider but geographical forms of *Reakirtii*. Both *Sara* and *Reakirtii* are dimorphic, some females being white and others yellow, with all intergradations. The males are only occasionally slightly yellowed. *Reakirtii* may be distinguished from *sara* by its smaller size, and the discal band on primaries is blacker and more waved. Beneath, on the secondaries, the greenish tinge is more pronounced than in *sara*, and the apex and external margin of fore wings is heavier. Henry Edwards, in a letter to W. H.

1. Ann. Soc. Ent. Fr., 2, 10, 285, 1852.

2. Trans. Am. Ent. Soc., 2, 369, 1869.

Edwards (Butt. Vol. 1), writes: "As to *sara*, I first met with it two years ago in Santa Clara County, and was at once struck by its larger size, the yellow colour of most of the females, and the absence of the irrorated line along the anterior margin, as well as by the much fainter green markings on the under side of lower wings. Unlike *Reakirtii*, the species seems to prefer the open fields, flies much more slowly, and alights often upon flowers of *Brassica*, *Nasturtium*, etc. I am so accustomed to the two forms, that I can now distinguish them by the flight alone."

Preparatory Stages.—Scarcely anything is known of these. Edwards³ refers to the relationship of *sara* and *Reakirtii*, as shown by records of the pupæ. Again, in his supplement to the Butterflies of the United States (v., 3, p. 2, 1897), he refers to this. G. R. Minot, in a note in Entom. News (p. 158, 1902), briefly describes the egg, and records the oviposition on the "common mustard."

Food-plants.—Lembert⁴ reports the oviposition of *sara* and *Reakirtii* in the Yosemite National Park on the stalk of *Thysanocarpus pusillus*. In this locality *sara* has the same food-plants as *ausonides*, viz., *Brassica campestris*, L., and *nigra*, L. But there must be others also, as *sara* is found abundantly in the higher hills, where *Brassica* is very rarely met with.

Oviposition.—For the past several years we have observed numerous instances of oviposition. As a rule the eggs are tucked between the young sepals, but there is a great irregularity in this. Sometimes the eggs are placed on the peduncles, and quite often on the under side of the leaves, upon which the larvæ readily feed. On June 27, '07, a ♀ was observed ovipositing. Eight eggs were seen to be laid, one on a leaf, two on peduncles, and the others on the buds. She was then captured, and by the next afternoon she had deposited forty-five more eggs in the pill box in which she was confined.

Egg.—Length almost 1 mm.; fusiform, laterally marked with raised vertical ridges not quite so prominent as in *ausonides*, between which are finer cross-veinlets; base flattened. Colour light lemon-yellow when first laid, changing to orange in from twenty to thirty hours, and this colour is quite uniform until just before hatching, when the colour is duller.

First Instar.—Length, 1.5 at rest; in motion nearly 2 mm. Colour dirty yellow, sparsely covered with black hairs. Head rather large, black. The duration of the egg stage to the emergence of the young larvæ varies

3. CAN. ENT., XXIV, p. 52, 1892.

4. Entom. News, 6, 137, 1895.

considerably, according to the condition of the weather. Our records show from four to eight days.

Second Instar.—Much as in preceding; a little over 3 mm. in length; colour generally lighter.

Third Instar.—Length about 6 mm. Colour greenish, with a yellow lateral stripe and a light dorsal line, sparsely hirsute; head black or dark green.

Fourth Instar.—Length about 15 mm.; uniformly dull grassy green; head rather darker, large, bilobed, with many ferruginous coloured short hairs; body also covered with same clothing, and also more scattered long black bristles. A whitish lateral stripe edged below with darker; ventral stripe very faint.

Fifth Instar.—Average length about 27 mm.; colour slightly darker than in preceding stage, head concolorous. A rather wide lateral band on the line of the spiracles, and continuing on the side of the head; dorsal line obscure. Head small, more so than the body, distinctly bilobed; head and body covered with many short black tubercles or hairs.

Pupation.—The method of pupation and spinning the girdle is so similar to various well-known species of *Pontia*, that we do not repeat it here. We have never been able to find the pupa in nature, but Mr. F. X. Williams tells us he has found several pupæ of both *sara* and *ausonides* suspended at the base of the food-plant.

Pupa.—Colour very light silvery-gray, the ventral area lighter; pronotum bluntly produced, the wing-cases thereon marked in white; ventral line and ridges dark; outline curved, more so than *ausonides*, but not so much as in *lanceolata* or *pima*; spiracles indicated by blackish points. Considerable variation occurs in the curvature of the profile; one pupa we had was very straight, more so than in any of the other species; palpi case more or less recurved, sometimes quite noticeably so. Normal length 22 mm.

We are much indebted to Prof. Chas. A. Shull for copying for us the text in this genus from Edwards's Butterflies of North America.

ENTOMOLOGICAL SOCIETY OF AMERICA.

The fourth meeting of the Entomological Society of America was held in Baltimore, Dec. 30 and 31, in affiliation with the American Association for the Advancement of Science and other Societies. The number in attendance was exceptionally large.

The sessions were called to order on Wednesday morning by the

President, Dr. Wm. Morton Wheeler. The report of the Committee on Nomenclature was received. It will be printed in the "Annals" and brought up for discussion next meeting. Appropriate minutes were adopted in regard to the deaths of Drs. Ashmead and Fletcher, and the deaths of Messrs. C. A. Davis, A. Craw and A. V. Taylor were also announced by the Chair. The election of the following Fellows was announced: E. P. Felt, S. W. Williston, A. D. MacGillivray, T. D. A. Cockerell, E. D. Ball, and also the election of 39 members.

The following suggestion was considered and referred to the Committee on Nomenclature: "That the Entomological Society of America should undertake to get out a list of all names of insects, to be used as a standard code, like the A. O. U. code." The following resolution was adopted and referred to the Executive Committee with power to act: "That it is the sense of the Society that the duty on insects is objectionable and should be abolished."

An amendment to the constitution was proposed, to be voted on at the next meeting, abolishing the present requirement that officers shall be chosen only from the list of Fellows. An additional by-law was adopted, as follows: 6. "Any member may become a life-member upon payment of \$50 at one time, and shall be exempt from further assessments. He shall receive during his life one copy of each issue of the Annals."

The following officers were elected: President, Dr. Henry Skinner; First Vice-Pres., Prof. Herbert Osborn; Second Vice-Pres., Dr. A. D. Hopkins; Sec.-Treas., J. Chester Bradley. Additional members of the Executive Committee: Prof. J. H. Comstock, Dr. John B. Smith, Dr. W. M. Wheeler, Rev. Prof. C. J. S. Bethune, Mr. E. A. Schwarz and Prof. Lawrence Bruner. Standing Committee on Nomenclature (for three years), Dr. E. P. Felt, to succeed himself. Member of the Editorial Board, to fill the vacancy caused by the death of Dr. Fletcher, Rev. Prof. C. J. S. Bethune.

On Wednesday afternoon a joint session with Section F., A. A. S. was held, at which Dr. John B. Smith presided. At both this and the following session on Thursday very full and interesting lists of papers were read.

The sessions closed with an exceedingly interesting address on Thursday evening by Dr. E. B. Poulton, Hope Professor of Zoology in Oxford University, England, on "Mimicry in the Butterflies of North America." The address was illustrated by many beautiful lantern slides, and was attended by a large and appreciative audience. It, and also the full minutes of the sessions, will be published in the "Annals of the Entomological Society of America."—J. CHESTER BRADLEY, Sec.-Treas., Ithaca, N. Y.

THE EGGS OF *LUTZIA BIGOTII*, BELLARDI (CULICIDÆ).

BY ALLAN H. JENNINGS, ANCON, CANAL ZONE, PANAMA.

On May 30, 1908, while collecting along a rapid mountain stream on the Island of Caldera, Porto Bello Bay, Rep. Panama, I secured several masses of mosquito eggs, which subsequently proved to be those of *Lutzia Bigotii*.

They were taken from a small pool in the rocky bank of the stream, the water of which was supplied by the stream itself, the pool being nearly filled with vegetable matter consisting of dead leaves, twigs, petals of flowers, seeds, etc.

Nearly full-grown larvæ of *Lutzia* were present, as well as many of *Anopheles eiseni* and many of several species of *Culex*, none of the latter, however, being bred.

The eggs were cylindrical, about one thirty-second of an inch in length, as nearly as could be estimated (no means of accurate measurement being at hand), slender, and terminated in a nearly hemispherical head of the same diameter as the body of the egg, which, however, was drawn to a low point or apex. The body of the rod-like egg was of a pale yellowish-white, with a metallic reflection appearing almost golden in certain lights, while the apex or head, which was sharply defined, was of a pale blue colour.

The eggs were arranged in a double row, forming a raft or boat. The largest mass contained twenty-five pairs, but with nothing to indicate its original size. Several smaller masses were taken from the same pool, but whether they had formed a part of the same or another raft it is impossible to say.

The eggs adhered to each other rather tenaciously, and did not become separated by being poured into a collecting vial nor by the rather rough journey back to camp.

The "boat" floats low in the water, the rod-like portion being nearly submerged, only the "head" showing above the surface.

I should think that these eggs were laid during the night of May 28th.

At 8 p.m. on May 30th, or presumably 48 hours after being laid, hatching began, the young being easily identified, and showing the characteristic attitude and habits of the larva of this species. They immediately began preying voraciously upon each other, and materially reduced their numbers before the next morning, when they were separated.

In hatching the young larvæ emerged from the bottom of the egg, the clear yellowish-white colour becoming dark and blackish and the cohesion of the empty cases being lost, the eggs fell gradually apart and the mass finally disintegrated.

The young larvæ were carefully separated and grew rapidly, increasing by the next morning fully 50 per cent. in length and doubling their size within 24 hours. The adults began emerging in ten days from date of oviposition, though an unavoidable lack of food material for a short time may have slightly lengthened the normal time of development.

TWO NEW SEED-INFESTING CHALCIS FLIES.

BY CYRUS R. CROSBY, CORNELL UNIVERSITY, ITHACA, N. Y.

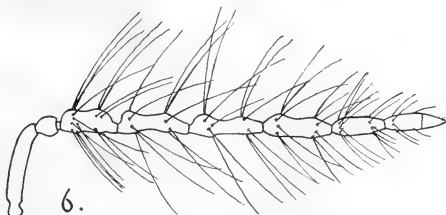
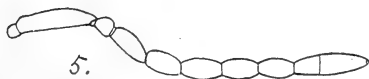
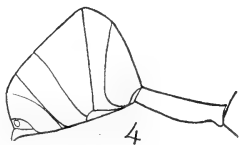
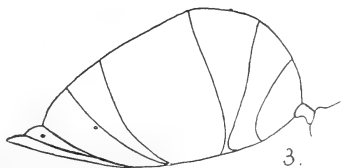
Prodecatoma phytophaga, n. sp.—Female: Length, 2.4 to 2.7 mm.; abdomen, 1.2 to 1.3 mm.

Head and thorax densely umbilicate-punctate. General colour black; face, cheeks and a ring around the eyes light yellowish-brown; sides of prothorax, lateral angle of scapulæ, mesopleuræ and ventral side of abdomen more or less suffused with brownish; pronotum with two small brownish spots sometimes obsolete.

Head seen from above as wide as the thorax, concave behind, strongly convex in front, a distinct frontal furrow present, in which the front ocellus is placed; seen from in front a little wider than high; the eyes small and widely separated. Face with a system of fine ridges radiating from the clypeus.

Propodeum with a median longitudinal depression, broad and regularly concave; propodeum on the sides rugose-reticulate, within the furrow densely, finely and distinctly reticulate-punctate; anterior end of depression with two smooth submedian pits, posterior end with a semi-circular row of similar pits. Between this row and the insertion of the petiole there is a transversely striate elevation. No median carina present, except between the two anterior pits. Colour of propodeum black, except that in some specimens there is a testaceous streak on each side of median depression.

Antennæ dusky, under side of scape yellowish; club and scape of about equal length; pedicel short; funicle joints submoniliform, the first slightly longer than the others; club elongate-oval, obtusely pointed at tip, the last two segments not separated by a distinct suture. Coxæ black, in some specimens more or less yellowish; rest of legs dull yellowish;



PRODECATOMA PHYTOPHAGA, CROSBY.

posterior femora with a black area on the outside ; posterior tibiæ more or less infusate. Wings hyaline ; veins brownish. For relative length of veins see figs. 1 and 2.

Abdomen seen from above pointed ovate ; segment 5 twice as long as 4, its posterior margin broadly concave ; segment 3 two-thirds as long as 4 ; dorsum of abdomen black, the venter brownish, the amount of brownish varying in different specimens ; sometimes a band runs up on the side of segment 5 so as to be visible from above ; on segment 5 the brownish on the anterior margin is nearly continuous across the dorsum ; on segment 7 the black is confined to a large basal triangular spot, which does not quite attain the tip. The abdomen is smooth and shining, with a very delicate hexagonal reticulation of impressed lines. The relative length of the segments as seen from the side is shown in fig. 3.

Male : Length, 2.7 mm. ; abdomen, 1.2 mm. Differs from the female in having the thorax entirely black (in two specimens only are the pleuræ brownish), in the greater amount of black on the head and in the very small amount of brownish on abdomen.

Median longitudinal depression of propodeum with a distinct furrow, irregularly rugose, sometimes with the ridges so arranged as to give a median carina.

Antennæ black, with the scape yellowish, except distal half above ; pedicel below and ring-joint yellowish ; the funicle joints pedicellate and distinctly constricted in the middle, clothed with two whorls of long hairs. The first joint of the club is more distinctly separated than the last two. Posterior femora and tibiæ darker than in the female.

Petiole much longer than posterior coxæ, three-fifths as long as rest of abdomen, finely rugulose, with a short median and two lateral carinæ at the posterior end. Abdomen seen from the side straight below, highly arched and squarely declivous in front. The relative proportion of the segments as seen from the side are shown in fig. 4.

Described from 5 females and 17 males, reared during the summer of 1908 from seeds of Virginia Creeper, *Parthenocissus quinquefolia*, collected at Ithaca and Taughannock Falls, N. Y. Under natural conditions the adults appear during late July and early August.

Eurytoma rhois, n. sp.—Female : Length, 1.7 to 2.8 mm. ; abdomen, .9 to 1.5 mm. General colour black ; head and thorax densely umbilicate-punctate.

Dorsal view of the head is shown in fig. 7. In form and sculpture the thorax is very similar to that of *Eurytomocharis triodia*. Propodeum

coarsely rugose on the sides ; the longitudinal median depression broad and shallow, densely and distinctly reticulate-punctate, except in the longitudinal furrow, which is rugose and much wider in front than behind, where there is frequently a single or rarely a double longitudinal carina. In the smaller specimens the median furrow is entirely lacking.

Antennæ slightly clavate, dusky, except scape beneath, which is dull brownish-yellow. The relative length of the segments is shown in fig. 8 ; viewed at a different angle the club is a little broader. Coxæ black ; femora black, tip yellowish-brown ; tibiæ brownish, more or less infusate medially ; tarsi nearly white. On the cephalic face of front coxæ there is a deep diagonal furrow bounded in front by a distinct ridge. This ridge near the upper outer angle makes a sharp turn and extends transversely around on the side of the segment. Mesosternum has a distinct median pit in front ; median carina lacking, except posteriorly, where it is represented by a delicate ridge. Wings hyaline. (Figs. 9 and 10.)

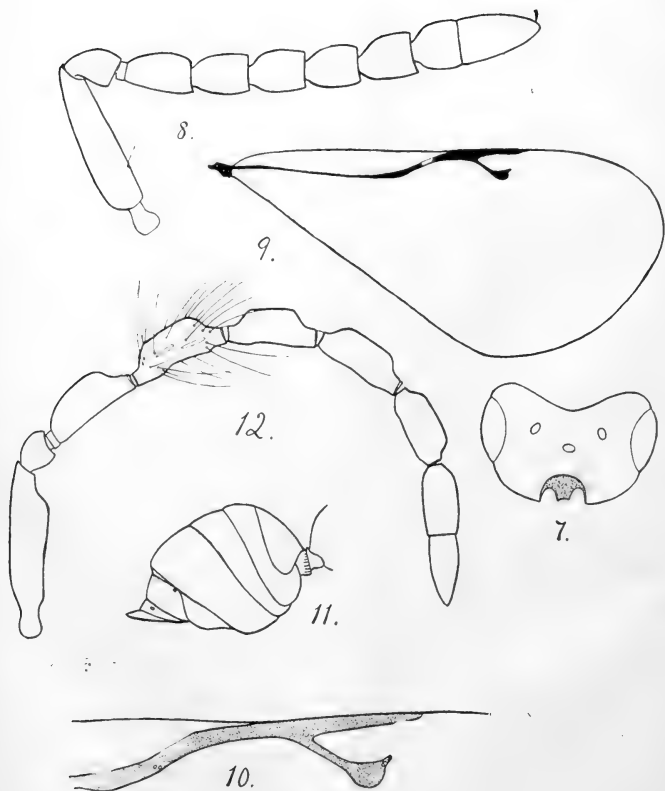
Abdomen smooth, without sculpture, subcompressed, seen from the side broadly ovate, the tip sharp-pointed ; segments 2, 3, and 4 subequal, the fifth longer than 3 and 4 together, the sixth very narrow and gently emarginate in front of the spiracle of the seventh ; the seventh segment clothed with fine white pile. (Fig. 11.)

Male: Length, 2 to 2.4 mm.; abdomen, .9 mm. These measurements are only approximate on account of the contracted condition of the abdomen in these specimens.

Propodeum with the median longitudinal depression wide and shallow, the furrow much less distinct than in female. The legs and wing-veins are much darker than in female. Antennæ black ; scape at base and ring-joint brownish. Scape slightly enlarged beneath towards tip ; pedicel subglobose ; the five funicle joints subequal, arched above, not constricted at the middle, briefly pedicellate, and each with two whorls of rather short hairs ; club as long as scape, two-jointed. (Fig. 12.) Petiole slightly longer than the hind coxæ, and finely but distinctly rugulose-reticulate ; coxæ with the same sculpture above. The body of abdomen is highly arched above, squarely declivous in front ; the fourth segment is longer than the fifth and sixth together.

Described from numerous specimens reared during the summer of 1908 from seeds of Sumac, *Rhus hirta*, collected at Ithaca and Taughan-nock Falls, N. Y.

Schreimer (Zeitschr. wiss. Insbiol., IV, pp. 26-28, 1908) gives an account of the phytophagous habits of another species of this genus, to



EURYTOMA RHOIS, CROSBY.

which Mayr has given the manuscript name of *Eurytoma Schreimeri*. It infests the seeds of the plum in Astrakan, Russia, and causes considerable damage to the crop, the infested fruit dropping while still quite small.

EXPLANATION OF PLATES 2 AND 3.

Plate 2, fig.	1.—	Prodecatoma phytophaga, ♀ wing.
" "	2.—	" " stigmal area of ♀ wing.
" "	3.—	" " ♀ abdomen from side.
" "	4.—	" " ♂ abdomen from side.
" "	5.—	" " ♀ antenna, hairs omitted.
" "	6.—	" " ♂ antenna.
Plate 3, "	7.—	Eurytoma rhois, ♀ head from above.
" "	8.—	" " ♀ antenna, hairs omitted.
" "	9.—	" " ♀ wing.
" "	10.—	" " stigmal area of ♀ wing.
" "	11.—	" " ♀ abdomen from side.
" "	12.—	" " ♂ antenna.

THE JAPANESE COCCIDÆ.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

In the Bulletin of the Imperial Central Agricultural Experiment Station of Japan, Vol. 1, No. 2 (1907), Mr. S. I. Kuwana has published a new list of the Coccidæ of Japan, with numerous new species. I am indebted to Dr. L. O. Howard for the loan of the work, which is probably little known in this country. A very beautiful *Icerya*, illustrated by coloured figures, is introduced as *I. okadæ*. It is, however, exactly like *I. seychellarum* (Westwood), and I do not see any reason for separating it from that species, except that according to the figure the femur is much stouter. *Cerococcus muratæ* is a most interesting species, but I think it should be known as *Solenophora muratæ* (Kuw.). *Pseudococcus takæ* (*Dactylopius takæ*, Kuw.) is a new species on bamboo; the figure of the antennæ shows nine joints, although the description indicates only eight. From the figures, and the general appearance, one might suspect the insect to be a *Phenacoccus*. *Ripersia oryzae*, Kuw., found at roots of rice, has large subcylindrical caudal lobes, and cannot be regarded as a true *Ripersia*; no doubt the discovery of the larva and male will throw light on its affinities. *Aclerda* (?) *biwakoensis*, Kuw., on *Phragmites*, should be compared with *A. japonica*, Newstead; it might be the same, but for apparent differences at the caudal end. *Pulvinaria Kuwacola*, on

mulberry leaves, is a curious species with a very short ovisac. *Lecanium kunoensis*, Kuw., is very much like *L. cerasorum*, Ckll., and may possibly be the same. *Eulecanium glandi* (*Lecanium glandi*, Kuw.) is an immense species, 15 mm. long, found on apple, pear, etc. *Xylococcus matsumurae* is given as a new species, but it was originally introduced to our notice in *Insect World*, March, 1905. It is not a *Xylococcus*, but forms a remarkable new genus. The table of genera allied to *Xylococcus*, as given in *CANAD. ENTOM.*, Oct., 1899, p. 275, may be enlarged as follows :

Antennæ of adult female 8-jointed ; first joint extremely large ; second short, very much broader than long ; joints broader apically than basally ; last joint oblong, longer than any except the first ; body elongated, $3\frac{2}{3}$ times as long as broad, blunt posteriorly ; legs well developed, the anterior femora noticeably stout ; tibiæ much longer than tarsi ; no mouth. (Russia) *Steingelia*, Nasonow (type *S. gorodetskia*, Nasonow).*

Antennæ of adult female 9-jointed.

With an anal tube producing a long rod or thread of wax ; last joint of antenna of larva moderate, with long bristles

(Europe, U. S.) *Xylococcus*, Loew.

With no anal tube ; last joint of antenna of larva exceedingly large, with short bristles (Japan, Ceylon) *Kuwania*, Ckll.

Antennæ of adult female with 10 or 11 joints.

Female with a marsupium, in which the eggs are laid

(Australia) *Callipappus*, Guérin.

Female without a marsupium ; broad posteriorly, not elongated, antennæ 10-jointed, close together ; larva with antennæ 7-jointed, and very peculiar crab-like legs, the femur large ; male without whorls of long hairs on the antennal joints ; caudal brush long, arising from the apical segment ; rudimentary hind wing with very large hooks (Japan)

Matsucoccus, Ckll. (type *Matsucoccus matsumurae*, Kuwana).

Matsu is the pine-tree, on which the new genus was found. It is evidently related to *Callipappus*, but much less specialized, probably representing the general stock from which *Callipappus* arose.

In his list, Mr. Kuwana enumerates only two species of *Asterolecanium* ; but he himself has sent me two others ; one new, the other (collected by Mr. Kuroyuwa in the Lu Chu Islands) is *A. bambusæ*, Boisd.

*I received this insect some years ago from Professor Nasonow, and understood that he was about to publish it, which he has done in *Ann. Mus. Zool. Acad. Imp. Sci., St. Petersburg*, xiii, p. 345. The specimen is now at the Bureau of Entomology, U. S. Dept. of Agriculture.

NEW HISTORIES AND SPECIES IN PAPAIPEMA (HYDRÆCIA).

BY HENRY BIRD, RYE, N. Y.

(Continued from Vol. XL, page 30.)

For some years past the writer has wondered if the species of *Papaipema*, boring as a larva in *Helianthus giganteus* throughout this section of the Atlantic seaboard, was really the *necopina* of Grote. The fact of its restricted occurrence, which a wider knowledge of our fauna has yearly accentuated, made us wonder whether Buffalo, N. Y., the type locality, would in any likelihood support this species. Ten years back this local form was sent to Mr. Grote when he was at Hildesheim, Germany, and confirmed by him to be the *necopina* he had described twenty years before. His types, however, were not with him for comparison, being in the British Museum, and there remained a slight difference in the description of his species and the local form. With each succeeding year that it was bred at Rye, and the occurrences were in goodly numbers, we became more impressed with the constancy of the species, and that, in the slight degree wherein it differed, this discrepancy always held. Later comparisons by different ones of the British Museum types with Rye material elicited no suggestion of a tangible difference. Finally *imperturbata*, working in *Helianthus divaricatus*, was encountered, and it differs from the description of *necopina* quite as much as the seaboard form. Certainly it and the latter are very distinct, though superficially the moths are much alike. At this time both are sent to the British Museum, as Sir George Hampson is studying the group in the preparation of his Catalogue. He reports the species in *H. giganteus* to be undoubtedly *necopina*, though noting the presence of a transverse posterior line on the primaries, which does not occur in the originals. Later on he asks, "Can there be a third species and this the typical *necopina*?"

At about this time, however, material for identification had been received by the writer from Messrs. Lucas and Moeser, of Buffalo, and bred by them there, among which appeared a form running larger than *imperturbata*, though returned as probably that species. It certainly was not "*necopina*" as we had so long known it. The matter was deemed worthy of further investigation, and on a kind invitation to explore some of their favourite preserves in July, 1908, a few profitable days were spent in that locality. It soon became apparent that the species they had reared was a very common and well-established one there, occurring everywhere that neglected areas allowed the growth of *Helianthus tuberosus*, its

apparently preferred food-plant, to flourish. In some places the larvæ were so plentiful as to overrun the burdocks and probably other weeds, but in no instance was it found in *Helianthus divaricatus* which grew in the infested localities or elsewhere. *H. giganteus* was not noticed at all.

In due course, for it is not a late species, as is the seaboard form, a series of the moths come forth and prove conclusively that we are dealing with *necopina*, Grote, at last. Some variation is found to exist, and it appears the types are well-developed specimens of the darkest form. The larva is a vigorous one and possessed of a good appetite, which the rugged food-plant allows to be satisfied. It enters the plant a few inches above the ground level and works downward two or three inches below this line, but in no instance does it get down to the tubers, which are much deeper. Its work produces an elliptically elongate swelling, about twice the size of the normal stem and from three to five inches long. The original aperture of entrance is, after a while, given up for a larger one lower down, from which the abundant castings are ejected. At maturity this opening is enlarged that the larva may leave, for the pupal change does not occur in the gallery. From their advanced condition at July 15th it was evident that the larvæ must have emerged from the hibernated eggs in the last days of May, as we found the brood well on in the penultimate stage. It is characterized as follows :

Head normal, well rounded, shining and of golden-russet colour, mouth-parts tipped with brown ; width, 2.4 mm.

Body cylindrical, a little larger at the middle in this stage. The dorsal line is broad and continuous ; the subdorsal equally pronounced, except on the first four abdominal segments, where it is lost. The colour is a pale, burnt-sienna ground, on which the dull yellowish-white stripes are plainly shown. The shield on joint one is fully as wide as the head and nearly covers the segment above. It is paler than the head, shining, of a honey-yellow hue, edged laterally with black. The tubercles are small and nearly of one size ; IV, the largest of the lateral ones, is the size of the spiracle ; the latter shining black, the tubercles brownish-black. I and II on joint eleven form the corners of a pronounced square, and are not confluent. The anal and leg plates are normal and agree with the thoracic in texture. There is no symptom of the accessory tubercle IVa on joint ten. Length, 40-43 mm.

Maturity finds the larva a little more robust, the colour faded to a soiled whitish translucence, with the lines lost or nearly so. The tubercles

are smaller and fainter, otherwise no change. Plates the same, the thoracic is the most noticeable marking. Length, 43-45 mm. Larvæ at Buffalo became normally mature July 22-28; the parasitized or diseased examples are in evidence some days later. *Necopina* larvæ belong to the major section of the genus in having the continuous dorsal line and no accessory tubercle IVa on joint ten. Excepting a very slight degree of colour or size, there is little to differentiate them from a dozen other species.

The pupal change occurs outside of the boring under a slight depth of soil or refuse. It is a very normal pupa, and shows no character of individuality. The head and thoracic region are smooth, and show no unusual development. The anal spur consists of two minute points. Colour glossy chestnut-brown. Length, 20-24 mm.

The dates of emergence for a dozen specimens are Aug. 24th to Sept. 9th.

This species does not occur at Rye, N. Y., but seems most diffused north and north-westward. *Imperturbata*, Bird, from Western Pennsylvania, appears to be a geographical race, of smaller size and having paler secondaries. An absence of larval difference points to this end; though a different food-plant, a pupal change in the burrow and a slightly later emergence bespeak some individuality from the features prevailing in the Buffalo colonies of *necopina*.

Establishing the identity of Grote's species leaves the local form, discovered many years ago by the writer, without name, and for which the following is proposed:

Papaipema maritima, n. sp.—Ground colour of the imago dark grayish-brown, or it may become somewhat olivaceous. Head is of the darker shade, the white scales at the base of the antennæ are not seen in this species. The antennæ are simple, a little heavier in the male. The vestiture of the thorax is heavy and looser than with most species, of the uniform ground hue densely powdered with grayish-white atoms. The erect thoracic tuft is loose, of conical form rather than the adze shape which usually holds. At rest it is tilted a little forward of perpendicular. The abdomen lacks the white powderings and the tufts are hardly discernible. The denuded head is perfectly smooth in front. Primaries nearly uniform in colour, powdered with grayish-white scales, the median space slightly darker; the t. p. line may be faintly made out, though it is never prominent. The t. a. line is still more faint, but it can usually be seen in the lower half of its course; both are indistinctly double. Ordinary spots

wanting. Secondaries dark smoky, the veins a little darker; a vague median shade line usually shows above. Beneath the wings are a lighter or mouse-gray, well powdered, especially the secondaries, across which the median line is traced in the dark ground colour. The sexual characters of the male are of the normal pattern. Expanse, 44 to 48 mm.

Habitat: The Atlantic seaboard in the neighbouring latitude of New York City.

One hundred and eight examples without mar or blemish are before the writer, and show scarcely any variation. In point of size their constancy is quite remarkable for the genus, and the phase of variation consists in a tendency of the ground colour to fade to an olivaceous hue. It is a rather heavy and broad winged species, larger and darker than *necopina*, has the t. p. line more conspicuous and lacks the bluish tone of the subterminal space which generally holds with the latter. A great many specimens have been disseminated from Rye under the *necopina* label, and attention must now be called to their incorrect determination. Co-types will go to the U. S. National and the British Museums.

Confined with their growing food-plant, these moths mate and oviposit sparingly. The ova are placed singly, or in clusters of several, about the base of the plant and live over the winter. The egg is nearly globular, the lateral diameter greatest, measuring nearly .7 mm. Colour is pale, shading yellowish, or in some cases to a flesh tint. Its period extends from the middle of October to first of June.

The young larvæ, upon hatching, at once enter the stems of the food-plant about two inches up and begin feeding, the original entrance serving as an orifice for disposing waste. They are very slender and delicate, yet able to bite their way into the solid stem. The first pair of abdominal legs are aborted and the larva moves in a semilooping manner. On entering the second stage the dark central portion of the body becomes evident and the white longitudinal lines appear, but all are discontinued on the first four abdominal segments. We are now able to place the larva in that section containing *cerussata*, *sciata*, *inquæsitâ*, etc., and from this time to maturity this prominent feature continues. June 28th finds them well on in the third stage; a period of nine days per stage seems to prevail, as with other species. Larvæ now measure 24 mm. in length, and are of the usual smooth cylindrical form. The rounded head is of a golden-yellow hue, does not show the black side line as it occurs in *nitela* and others; width, 1.9 mm. The longitudinal lines on the thoracic

joints are white and overbalance the dark purplish-brown body colour ; dorsal line narrower than subdorsal or substigmatal ; they do not entirely cross these joints, but end at the middle of the third segment ; their continuation on the last five joints shows the ground colour appearing in a stripe of width equal to the lines. The dorsal is here as wide as the subdorsal, but the substigmatal becomes blended with the white of the under side. The inception of these lines is really on the posterior edge of joint seven, as it plainly crosses the suture between seven and eight. The appearance of such a contrasting and queerly-marked larva seems odd for a boring species where little colour generally occurs, but it is conventional for *Papaipema*, and we are enabled by a little change in this pattern and some structural details to arrange the species in a very convenient table. While at variance with the disposition of the moths in some respects, it is to be considered more fundamental, doubtless. The tubercle arrangement is normal for the stage : on joints two and three I, II and IIIa are small and in line directly across the segment ; III, IV and V are large, in triangular setting ; IV very large, the size of the other two combined. On the abdominal segments this one is not quite so large, yet it exceeds the others ; all are shining black, and bear a single, stiff, fine seta, nearly a millimeter in length. The thoracic and anal plates are as usual, the former edged with black at its lower side. The features hold through the succeeding stages, the colour becoming lighter with each moult and the tubercles proportionately smaller. At maturity we have a translucent, whitish larva, which tapers more posteriorly than any other, the anal extremity with its protective shield being proportionately very small. The tubercles can scarcely be discerned even with a lens ; III and IV on the thoracic joints being the only conspicuous ones. Even I and II on joint twelve, which usually hold their prominence, have faded to uncertain definition. The thoracic plate loses its black edging, but remains as wide as the head. Well-developed larvæ attain a length of 52 mm. Maturity is reached about Aug. 15th, and pupation occurs within the boring. The pupa differs from any other species in possessing two small tubercles in front, one between the antennæ, the other slightly above. It might be expected the moth would show a corresponding structure, but this does not occur. At the middle of the thoracic region the pupa shows a slight constriction and the abdominal segments taper more than usual. It is extremely active, and can bend to a greater angle than others. When disturbed, as they so frequently are, they revolve rapidly, standing upright

on the anal extremity and bend until the head rests against the wall of the gallery. Length, 25 mm.; emergence Sept. 23rd to Oct. 10th. The habits of *maritima* have been extensively observed, for it is so easily located, and its near-by occurrence has placed it conspicuously before the writer, during the fifteen years following its first discovery. Yet in all this time there has never been seen a single moth at large, though they breed within a few hundred yards of windows, where for many years all comers to light were welcome. At sugar, at electric light, or gas lamp, never a specimen; it would remain unknown to us still if we had never lifted the lid of a breeding-box. This secretive and inactive condition becomes conspicuous when it can be said thousands of larvæ have no doubt been noticed in this Rye locality and hundreds of the moths reared without serious effort. Like their congeners, they are very punctual in their date for emergence each year, and a glance at the calendar will note the day for gathering a supply of the ripe pupæ. Still their concerted emergence will be influenced by weather conditions to some extent; a warm sunny day following the cold or wet conditions that appear in early fall will find them coming out in numbers, most notably in the evening hours, between eight and ten.

The food-plant is *Helianthus giganteus*, and it makes an admirable plant for the operations of a boring larva. While there is ample stem, wherein such examples as *cataphracta* and others are wont to extensively tunnel when they happen to select it, *maritima* works only at the base, and the plant which is growing rapidly at the time of the intrusion counterbalances the effect by the formation of a large gall directly above the root. These ovate swellings, sometimes more than twice the diameter of the plant, and an inch and a half across, give easy intimation of the larval presence. An old and vigorous root clump may frequently harbour eight or ten larvæ, and usually the last year's galls may be also seen, though a single stem is never tenanted by more than one. And while this gall formation is an individual feature of the species, it is the neat door they prepare for the emergence of the moth that has always interested the writer. The last act of the larva before the final ecdysis is to gnaw a U-shaped opening through the walls of the gall to the epidermis, which is left intact, except that around the lower periphery minute perforations are made. None are made across the top, however, and in a few days this skin becomes dry from receiving no sap, shrinks a little and breaks free at the bottom, while it hangs very nicely from the top where no perforations were made. Without this door the moth could not possibly escape, and

while other species make a similar exit and leave a portion of the epidermis over the opening, there is no apparent design in the matter. So the most gentle push will swing this portal from within, and, unfortunately, a similar pressure will answer from without, a fact soon discovered by the vulgar herd. But *maritima* has never had any experience with the outside world, and soon its handiwork is destroyed by the scores of stragglers that are ever seeking the seclusion afforded by such a commodious chamber, and a perfect door is rarely opened by the moth for which it was intended. Conditions which make *maritima* especially favourable for observation are directly traceable to the food-plant, and it is a pleasure to conceive we can now see it at work in a manner that prevailed primitively. In *Helianthus giganteus* we meet a plant which flourishes many years from its root-clump without change, sending up rugged stems, often a dozen or more, to the height of eight feet, each succeeding year. It is one of those strong, coarse weeds that easily work out their salvation in the competition with their neighbours, and is naturally well disseminated. While a plant of the open, it attains greatest perfection in those semi-swampy conditions that prevail where the fresh-water streams of long ago have met the arms of the sea and deposited at tide-water level the rich humus and peat formation that have been the accumulations of centuries. The north shore of Long Island Sound presents innumerable instances of this nature, and from their underlying peaty deposits and the slightly saline character, a certain portion of these areas is immune from the advance of an arboreal growth, and the primitive forest never claimed them. Here the flora is naturally somewhat unique, and the insect life, of course, conforms to it. Our *Papaipema* species have not been slow to avail themselves of such conditions, an evidence of their aristocratic proclivities, and flourish here according to a more or less prearranged schedule. Furthest out where the salt-meadow conditions prevail and where the spring tides overflow the soil twice monthly, grows a luxuriant fringe of *Solidago sempervirens*, its roots deep in the meadow muck and containing *P. duovata*. Immediately inside this *Helianthus giganteus* begins to appear where a handful of upland soil serves to temper the muck, and *maritima* will be found in the outermost vanguards. From the moment upland proper begins there is a revel of those rank plants which perennially hold their own; the coarse *Aster umbellatus* tenanted by *P. impecuniosa*, *Lilium superbum* a choice tit-bit for *cataphracta*, *Cicuta maculata* containing *marginidens*, and *Thalictrum polygamum* with its ever-present *frigida*. As we come to

the shade of the encroaching wood, we find the Brakes tenanted by *inquasita* and *pterisii*, the Speedwell with its *sciata*, the Ironweed with *cerussata* in its crown. In the deeper shadows *Collinsonia Canadensis* shelters both *astuta* and *duplicata*. If fortunate in the locality, the *Heracleum lanatum* may contain *Harrisii*. A little farther up the bed of the ancient stream, if a Sphagnum bog has formed, there may lurk in the Pitcher plants the glorious *appassionata*. When such localities have escaped the torch for a number of years, more *Papaipema* species may be found there to the square yard than in any other territory.

In the perpetuation of species, "survival of the fittest" may have its place among the higher animals and elsewhere, but among insects, and with *maritima* in particular, we are impressed with what is rather a survival of the most fortunate. The casualties from parasitism, disease and depredations of enemies of one sort and another bring the fatalities up to an alarming percentage. But after all, if the progeny of a single pair amounted to more than another pair in the general outcome, we should soon have to do with pests rather than the elusive and long-overlooked occurrences of our *Papaipema* species. With the one under consideration the mode of larval habit lends nicely to such study, and this question of a balance in nature is admirably demonstrated. It, of all the congeners, shows the least disposition to ever leave its burrow, and, as it is so easily located in the conspicuous gall, it is not difficult to tell just how many of a certain locality and brood attain maturity or fall to eventualities. The question how many ova may have been deposited there and escaped the mites, which destroy such numbers shortly after they are laid in the fall, or have survived other vicissitudes of the winter period, to ultimately give up their larvae, is only problematical. From the moment a larva locates in a plant we know it, and it is easy to figure out the average which mature, and this is surprisingly small.

Of parasites, the most abundant is a Hymenopteron, a species of *Hemiteles*, which attacks many of the other species as well, most notably, perhaps, *nitela* and *pterisii*. Occurring with it is a wingless form of some *Pezomachus* species, whose presence with the former was a surprise. The *Hemiteles* larvæ attain maturity as the host-larva reaches the last moult, causing it to succumb before pupation. The parasites at maturity pierce the skin of the host and immediately spin up a tough, brownish cocoon, of elliptical form, longitudinally creased and about three millimetres in length. From 30 to 40 usually infest one host, and all emerge and spin

their cocoons within a few hours. These are formed in a mass about, though not adhering to the disabled host, and become gummed together into a hard cluster. The winged adults escape by biting an opening at the end of the cocoon. To definitely determine the pupal period, a mass of 32 cocoons from a certain host was obtained Aug. 3rd and placed in a test tube, when, on the 31st day, 18 *Hemiteles* species and two curious ant-like creatures appeared. A lens showed the latter to be possessed of an ovipositor, and to be only ant-like in their movements, all specimens, in fact, being females. Just what these wingless *Pezomachus* species may be doing in this mass of cocoons, which all seem alike, unless they are secondary parasites, does not appear. They are quite as large as the *Hemiteles*, though lacking wings. But there are interesting phases of polymorphism at work here, for it is found later that a good proportion of the *Hemiteles* pupæ live over the winter, and these evidently carry the perfect sexes. Four days later three minute examples of a secondary parasite, without question, *Loxotropha flavipes*, Ashm., appeared. Just how these little creatures work out their life-cycle must be a complex proposition, especially if dependent on other species than their present host. It is probable they pass the winter as adults, for they have been found as late as Dec. 1st hidden away in the *maritima* galls. In following up their career much would depend upon what period of the host's development they attacked. *Maritima* is preyed upon by another parasite of similar character, in a species of *Apanteles*. In this instance from 50 to 60 parasitic larvæ will emerge mature from the nearly full-grown host and spin up a cluster of pretty white silken cocoons, which open with a circular lid at one end to permit the escape of the imago. About 80 per cent. of these proved females, and the pupal period was ten days longer than the *Hemiteles*. No hyperparasite was observed, nor any cocoons holding over the winter. This species occurs infrequently with *maritima*, but very commonly infests *P. duovata*.

Of the larger Ichneumon parasites, there are several species which have been noticed, though their numbers never seem great. *Ichneumon lætus*, Cress., is quite often found, and probably does not reach the larva until late, for its emergence is always from the chrysalis. It is very late, too, in the pupal period before its presence is noted; apparently healthy and very active pupæ will, a few days before the time of giving up the moth, suddenly become dark and rigid, and soon one of these active wasps will eat its way out of the pupal shell. It is hardly possible that

this insect enters the gallery to place an ovum upon, or in direct contact with, the host-larva, unless it waits until the doorway is made for the moth's exit, for the ventilating orifice is too small to permit it to enter. There is a period of several days between the making of the door and the final ecdysis, when the larva is less active and shrinking for the change, and which render it especially vulnerable, and it is believed this is the time of attack. True, the ovum of the Ichneumon might be merely thrust within the ventilating opening, and the larva yet reach its host from this proximity. If the above supposition is correct, there would be a period of four weeks for the developments, and this seems sufficient.

I am indebted to Mr. J. C. Crawford, of the U. S. National Museum, for the determination of these Hymenopterous parasites. Of parasitic Diptera several have been noticed; one, a large hairy fly (*Masicera myoidæa* ?), is a rapacious enemy. In another case it appears the infestor may be simply a scavenger, as its larva had only been noticed about a decomposing caterpillar that had succumbed apparently from some previous trouble. Its pupa winters over as do the numerous puparia of another species whose presence within the galls was not understood. But they occur so commonly and in such numbers as to be reckoned with, in the life that flourishes here. Of the visitors, transient and permanent, which make these burrows their domicile, to the discomfiture of the original tenant, the most numerous and obtrusive are those common myriapods, the "sow-bugs," which gain access in some numbers through the ventilator, and later, by the exit door crowd the chamber to its full capacity. From twenty to thirty are often packed about the chrysalis, which wriggles and spins around as their movements excite it. We might fancy *maritima* pupæ have acquired their unusual activity and freedom of movement from the turmoil going on about them. It is due to these visitors that the hinged lid of the exit door is so soon broken down, and then such an enticing aperture naturally suggests security to other denizens of dark, damp places. Centipedes, snails, slugs, stray Coleoptera, and many species of ants are regularly seen. While these are mere visitors that congregate after the pupal change, and do not molest the pupa, unless it has died from fungous disease, the actions of two of the ants always appeared suspicious. In any breeding experiments with this genus the first move is to guard against the attacks of two common house-ants, these minute

red ones that appear in such multitudes about old houses, and the large rapacious black ones. The former will attack either larva or pupa, the grease possessed by these boring larvæ making them more sought for apparently. The black fellows await the emergence of the moth, and while yet soft from the pupa, before the wings have expanded, will rend it to pieces in an incredibly short time. What effect these ants have on the mortality in the field is unknown, for there would be nothing left to tell the tale were the action not observed. So when two ants of similar character are noticed, it is wondered if they are there with intentions against the owner. One is a small red ant, that occurs only in empty galls, and which has taken up its abode there, as later the pupæ are to be seen. But what has become of the *maritima* larva, it is not usual for it to be driven out by the mere presence of a visitor that is not hostile? And with the other, a pair would usually be found in a gall containing a live pupa, and they seemed to be very quietly awaiting events. So the matter was referred to Prof. W. M. Wheeler, who knows so much of ants and their ways, to prove an alibi in their case if he were able. His reply is as follows :

“ I think you have misinterpreted the intentions of these poor insects with regard to your moth larvæ.

“ The smaller ant is *Leptothorax curvispinosus*, Mayr, an ant which lives in small colonies and nests, by preference in hollow stems and galls. It is frequently found in the galls of *Gelechia*, on golden-rod, and no doubt would utilize the galls of *Papaipema* in the same manner. It is a timid creature, which feeds on minute insects and the honey-dew that may be spattered by the plant lice on the surfaces of leaves.

“ The large ant is the deälated queen of *Lasius claviger*, Roger. This insect had no intention of molesting your moth larvæ, as you supposed, but was seeking a small cavity in which to found her colony. The queens do not prey on other insects, but are plentifully supplied with nutriment in the form of a large fat body, and they draw on this exclusively while they are bringing up their first brood of workers. Of course, ants will take advantage of any small, nearly-closed cavity with hard walls for nesting purposes. This is especially true of small species, or the timid queens who are just starting out to form their colonies, and, of course, we would do the same if we were in their places ! ”

Aside from casualties already mentioned, an observer of the life-history of *maritima* cannot fail to encounter the work of two animals that

take toll in no small measure from the final outcome. Field mice and skunks consider these pupæ most delectable diet, and their thoroughness is so apparent in the demolished galls, one wonders how any escape their keen noses. The writer has drawn attention to this in an early paper, when the species was referred to as "*necopina*" (CAN. ENT., Vol. XXX, 131), how they always select a gall containing a pupa, and never one that contained a parasitized larva. This is easier than might appear, for they have but to feel for the exit door to know that a larva has matured and pupated therein. When there is no door there will be no pupa, for the *Hemiteles* had the first chance. The mice gnaw a hole half an inch in diameter or larger in the side of the gall, sufficient to extract the pupa, while the skunks with their greater strength tear a rougher and larger opening, and do a noticeable amount of scratching about the root-clusters. As very few pupæ escape in any locality these animals go over, they become an important factor in the economy of the species. So far as observed, no others suffer in this manner from these animals, though why the pupæ of *impecuniosa* escape is not easily explained.

In a final word as to the ontogenetic features displayed in *maritima*, that most at variance with the congeners is the tuberculate character of the front of the pupa, though the larva shows some individuality from its immediate associates, as, in fact, does the moth. The supposed great similarity to *necopina*, which has deceived all, vanishes when the species become properly known. While the tubercle is not continued in the imago, it may be inferred we have to do with a species connecting with *Ochria*, whose moth possesses an armature of this nature on the head, and which may be needed to force its way out of the chamber containing the pupa. With our species there is not this need, and the moth has lost the character, though a trace remains in the chrysalis.

There is the other alternative, of considering a pupal armature of use in opening a way to the surface through intervening tissues, in those cases where the moth emerges free at the outside of the burrow. Then *maritima* would be leading up to this specialization of *Ochria*. But no *Papaipema* make this effort of wriggling to the outlet, and all make openings to allow of the escape of the moths. Neither the pupa of *Ochria* nor its action is known to the writer, but the larva of *O. flavago* reflects a different phylogeny, more in keeping with *Gortyna*.

THE FRUIT-INFESTING FORMS OF THE DIPTEROUS GENUS RHAGOLETIS, WITH ONE NEW SPECIES.

BY J. M. ALDRICH, MOSCOW, IDAHO.

The typical forms of *Rhagoletis* in North America are distinguished by their black colour, the scutellum conspicuously white or yellow and bearing four bristles, the wings with cross-bands, which may be somewhat oblique and curved; the anterior cross-vein is situated about the middle of the discal cell; first vein bristly along its whole length, the third vein only at base.

Two aberrant forms are included in the catalogue, *suavis*, which is pale yellow, and *caurina*, which does not have bands on the wing. The complexity of the relations of Trypetid genera makes it difficult to assign all species to groups where they obviously fit, and it may be better to admit these two species provisionally than to assign them to other genera without examining specimens.

Mr. Doane, Ent. News, 1898, 69, suggests that *Rhagoletis zephyria* of Snow is a synonym of *R. pomonella*, and this I think is correct.

Mr. Coquillett, Jour. N. Y. Ent. Soc., VII, 260, 1899, refers *Acidia fausta* and *suavis* to *Rhagoletis*, and I also agree with this; the former, in fact, is the nearest known relative of *intrudens*, the new species described below:

Table of Species of *Rhagoletis*.

1. Colour pale yellow..... *suavis*, Loew.
Colour black or blackish..... 2.
2. Wing pattern in scattered spots, not bands..... *caurina*, Doane.
Wing pattern in bands..... 3.
3. Abdomen with pale cross-bands..... 4.
Abdomen without cross-bands, entirely black..... 8.
4. A hyaline cross-band extends entirely across the wing through the distal part of the discal cell..... 5.
The hyaline portion not extending entirely across..... 7.
5. Humeral and stigmatic cross-bands confluent behind. *tabellaria*, Fitch.
Humeral and stigmatic cross-bands not connected..... 6.
6. With a brown spot on the apex of the third vein..... *cingulata*, Loew.
Without such spot..... *ribicola*, Doane.
7. The entire brown pattern of the wing continuous..... *pomonella*, Wlsh.
The brown pattern discontinuous..... *striatella*, v. d. W.

February, 1909

8. Femora yellow..... *formosa*, Coquillett.
 Femora black.....9.

9. The humeral cross-band enclosing a hyaline triangle in
 front..... *fausta*, Osten Sacken.
 The humeral cross-band not enclosing a hyaline triangle. *intrudens*, n.sp.

Rhagoletis intrudens, n. sp.

Shining black; the following parts yellow: Front, face, antennæ, except apical part of arista, palpi, proboscis, cheeks, humeri, a streak from the humerus to the wing below the dorso-pleural suture, scutellum, halteres, all the legs, except coxæ and femora. Wings as figured, the veins whitish in the pale portions and blackish in the rest; the pale portions of the membrane are distinctly white, not transparent except close to the margin; anal cell with only a blunt point; first vein distinctly hairy to the tip.

Chetotaxy: Postvertical pair of bristles rather large, conspicuously white, all other bristles black: vertical 2, orbital 1, fronto-orbital 2 reclinate, lower fronto-orbital 3 cruciate, on lower edge of cheek 1, humeral 1, notopleural 2, dorsocentral 1 (behind the suture, there may be another where the pin is inserted), presutural 1, supra-alar 3, post-alar 0, scutellar 2, mesopleural 2 (on the posterior edge), pteropleural 1, sterno-pleural 1.

Abdomen uniform shining black, with rather coarse hairs, larger on the posterior margins of the segments; on the posterior margin of the fifth segment a row of well-developed bristles; sixth segment a little longer than the fifth, hairy; ovipositor retracted in the described specimen.

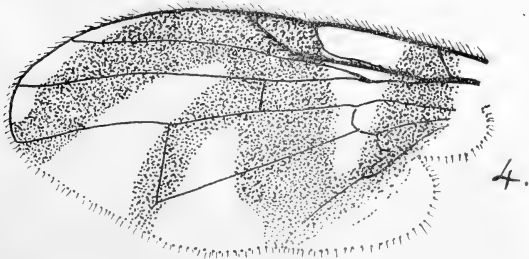
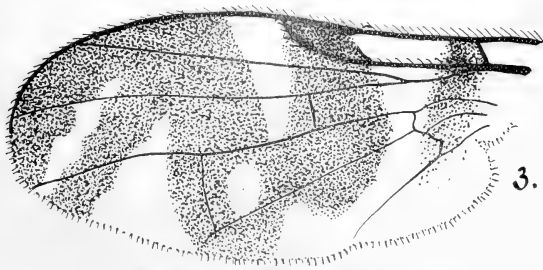
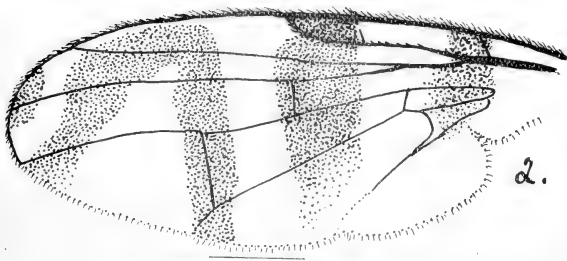
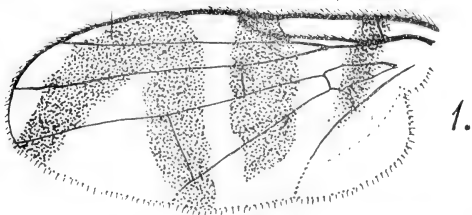
Third joint of antenna reddish, with an acute upturned point at end; arista pubescent; palpi with a few black hairs at tip.

Length, 4.1 mm.; of wing, 3.9 mm.

Described from one female specimen with the following label: "6.3142. W. R. Palmer, Victoria, B. C. Emerged at Ottawa, 19, VI, 1907."

It is highly probable that the same species occurs in the vicinity of Kendrick, Idaho, as I have found late sour cherries there considerably affected with a dipterous larva, which I have not reared.

A few words on the economic relations of the species may be worth while. The habits of but four species of our fauna are known; all these species are figured in the accompanying illustration, the pattern of the wing being sufficient to separate them. All the drawings are on the same



FRUIT-INFESTING FORMS OF RHAGOLETIS.

scale, and made with camera lucida. The upper figure represents the wing of *Rhagoletis ribicola*, Doane, which affects the garden gooseberry and currant in the State of Washington and in northern Idaho. It is a native species, as I collected an adult on a wild gooseberry at Pollock, Idaho, many miles from a railroad; its original food was doubtless the wild species of currant and gooseberry, so abundant in the Pacific Northwest.

There is another Trypetid, *Epochra Canadensis*, Loew, that infests currants and gooseberries from Maine to Vancouver Island, but as it belongs to a different genus I allude to it here only to note the similarity of habit, and perhaps save some one from a wrong identification of its larva.

The second figure shows *R. cingulata*, an eastern species infesting cherries. It has been reported so far only from New Jersey and New York, and doubtfully from the vicinity of Boston. I am indebted to Professor Mark V. Slingerland for specimens enabling me to figure this wing.

The third figure shows our new species, *R. intrudens*, and the fourth is the apple maggot, *R. pomonella*, Walsh. The last is now pretty well distributed in the eastern United States and Canada, but has not yet appeared west of the Rocky Mountains, as far as I know, although I have a specimen from Colorado. Walsh, in his original article, states that the larvæ are found in fruits of *Cratægus*, the thorn-apple, as well as in apple. As it is a native species, we may suppose that the wild crabs and the thorn-apples were its original food-plants.

It remains only to notice *Rhagoletis cerasi*, Linn., which is a European species affecting cherries; it may be introduced into the United States or Canada at any time, in fact, there are one or two unconfirmed references to it in our literature already. It strongly resembles in wing-pattern the first of our figures, that of *R. ribicola*, but the clear transverse band in the middle of the wing is widened in front and contains a triangular brown spot, the base resting on the costa and the apex extending to the third vein.

EXPLANATION OF PLATE 4.

- Fig. 1.—*Rhagoletis ribicola*, Doane.
“ 2.— “ *cingulata*, Loew.
“ 3.— “ *intrudens*, n. sp.
“ 4.— “ *pomonella*, Walsh.

With regard to the new species, *Rhagoletis intrudens*, described above by Professor Aldrich, this is the one referred to by the late Dr. Fletcher in his annual report for 1906, page 228, under the title, "A Cherry Fruit Fly, *Rhagoletis cingulata*, Loew." This insect caused noticeable damage to cherries, in 1906, in British Columbia.

Mr. W. R. Palmer, of Victoria, B. C., in whose orchard the insect was injurious, was asked to send to the Division some living puparia, but in 1907 he wrote that he was unable to find any during the winter. Writing under date of July 20th, 1907, he says: "We had a harder winter than usual, and they do not seem to be as prominent. They still stick to the same trees as last season."

No reports of injury by the larvæ of this fly have been received during 1908.—ARTHUR GIBSON, Division of Entomology, Central Experimental Farm, Ottawa.

LEPIDOPTEROUS GALLS COLLECTED IN THE VICINITY OF TORONTO.—No. 2.

BY DR. WM. BRODIE, TORONTO.

Eucosma Scudderiana, Clemens; *Pædisca saligneana*, Clemens.
(The High Solidago Gall.)

The galls were collected usually in the spring, February and March, occasionally late in the fall, and kept in a suitable jar, until all occupants were out; always two seasons.

Annual collections were made during 12 seasons, from 1883 to 1895, each collection averaging over 45 specimens. Most of the collections were from the vicinity of Toronto, a few from distant localities.

From 1854 to 1864 these galls were very common throughout North York, and are so still. I have found these galls at Owen Sound, North Bruce, Temagami, Algonquin Park, Tobermory, Manitoulin, North Bay, Essex, St. Mary's, St. Catharines, Whitechurch, Scugog and other localities, and no doubt they are common in Ontario wherever the host-plant, *S. Canadensis*, is found.

The galls are at the top of the main stems of the plants, usually within the flowering panicle, rarely on the branches of the panicle; usually but one gall on a plant, occasionally two, rarely three.

The galls are spindle-form, varying in size from 10 x 16 mm. to 12 x 28 mm.; diameter of stem below gall from 4 mm. to 5 mm.; the average of

ten galls collected in ten seasons, 100 specimens, was $9\frac{1}{2} \times 21\frac{1}{2}$ mm., diameter of stem below gall 5 mm.

The galls are unicellular, the larvæ for some time being closely confined in the cells. I do not think there is ever room for them to turn, and I am still in doubt as to their rather peculiar feeding habit.

The producers winter in the larva form, within the galls, pupate about May 1, and the imagoes emerge from June 1 to July 5; the average date of emergence is about the middle of June. From June 12 to July 1 I have taken specimens of the mature moth, while sweeping the hand net over *Solidago* blooms; it is a beautiful creature, strongly marked and readily recognized. The mature pupa pushes its way through the loosely-closed upper end of the gall, and the moth emerges into the environment of mature life.

The largest and most common parasite is *Macrocentrus pædisca*, Riley, easily recognized by its long ovipositor. This parasite emerges about the middle of July.

Perilampus platygaster, another parasite, emerges early in July; *Cryptus extrematis* still another parasite, seldom more than one individual from a gall; *Pimpla annulipes* also not rare. I bred *Copidosoma gelechia* from this gall, and once the secondary *Dibrachys boucheanus*.

From a lot of galls collected near Lake Simcoe, April, 1904, as well as producers and parasites, there emerged from May 2 to May 12, 1904, 18 specimens of a *Diplosis*, very much like gall producers; but, unfortunately, from the want of material I failed to determine whether these were gall producers or inquilines in *Eucosma* galls. The galls were all similar in size, shape and structure; normal *Eucosma* galls. In my notes I have entered as a provisional name for this species, *D. eucosma*.

I have found this gall restricted to the one host-plant, *S. Canadensis*, and there seems to be a fairly uniform relation between the producers and parasites in the vicinity of Toronto; so that year after year the galls are about equally numerous.

In Vol. 10, p. 202, CANADIAN ENTOMOLOGIST, Kellicott describes this gall, the habits and life-history of the larva and pupa of the producers.

Gnorimoschema asterella, Kell. (*Gelechia asterella*).

(The *Solidago latifolia* Gall.)

In Vol. 10, pages 203-4, of the CANADIAN ENTOMOLOGIST, D. S. Kellicott describes this gall and its producer.

He also gives a good engraving of the gall, but it is not that of a gall on *Aster corymbosum*, but on *S. latifolia*. The leaves at the top of the gall are evidently leaves of *S. latifolia*, and the angular form of the stem of the plant, which is always continued up the gall, is clearly shown by the engraving.

S. latifolia is one of our most common and beautiful forest flowers, having a wide geographical range over Ontario; and I have found the gall more or less common wherever the plant is found.

My first record of the gall is Aug., 1886, when I found it very common in a grand, primal, hardwood forest, in the Township of Whitchurch. My attention was directed to the galls from the fact that an ignorant old quack was using them as a cure for "fits," under the name of "Fitt Apples."

In a collection of 30 galls made May 29, 1890, a few miles north of Toronto, most of them were at the top of the stem, surmounted by a few leaves, occasionally but one, usually two. The galls at this date seemed to be mature, subtriangular, corresponding to stem of plant; from 20 mm. to 32 mm. long, and from 10 mm. to 15 mm. dia. In size, form and structure the galls closely resemble galls of *S. gallsolidaginis*. Rarely they occur on the middle and lower third of the stem of the plant.

From June 29, 1891, to June 25, 1896, annual collections of galls were made. Galls collected before the middle of June were immature, and seldom gave either producers or parasites. The producers had emerged from all the galls collected after the middle of August, but often contained larvæ and pupæ of parasites, *Cryptus*, *Pimpla*, *Copidosoma*, *Ephialtes*. The emergence of the producers was from July 28 to Aug. 20 in each season.

The following is an entry from my notebook, dated July 11, 1893: "Collected from wooded hillside, in St. James's cemetery, 35 galls, all terminal on stems of *S. latifolia*, all overtopped by a tuft of leaves, usually but two; plants not much dwarfed, but no flowers. July 13, 1893, from a wooded hill on the Don, collected 40 galls, all but one terminal, two galls on one plant."

From Aug. 7 to Aug. 20, 1893, producers emerged, and from July 17 to Aug. 17, 1893, four species of parasites: two *Pimplas*, one *Cryptus*, one *Ephialtes* emerged; *Copidosoma* occasionally the following spring, June, 1, 1894. The galls on growing plants appear to be full size, but still

solid, no open cavity, larva strictly confined in centre of gall, 3 mm. long. The parasites which I have bred from this gall are *P. conquisitor*, *P. inquisitor*, *C. extrematis*, *Ephialtes* sp., *C. gelechia*.

The structure of the galls, the habits of the larvæ, and the mode of exit from the gall, are very similar to those of *G. solidaginis*, and are all very fully described by Kellicott, in the article above referred to.

I have found what seems to be a lepidopterous gall, very rare about Toronto, on stems of *Aster corymbosum*, a spindle-form gall immediately under the flowering panicle, not at all like the gall figured by Kellicott but I failed to rear anything from them.

I found *A. corymbosum* very common all through the Temagami district, and the gall not especially rare, but as the galls I collected were immature, neither the producers nor parasites emerged from them.

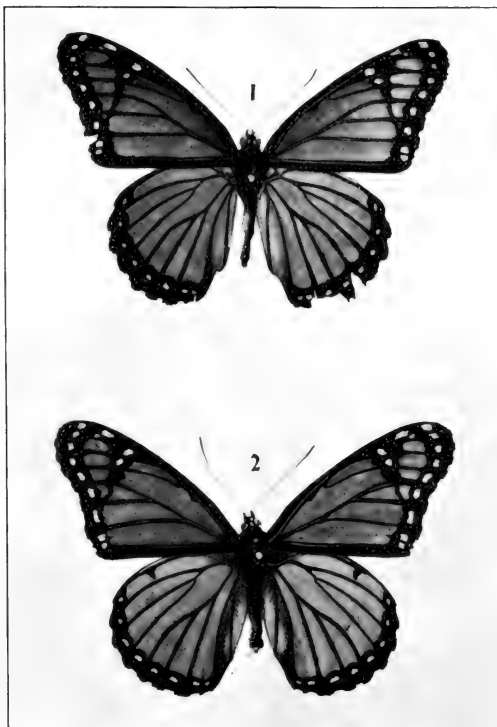
THE OTTAWA NATURALIST for January consists of a series of tributes of respect and affection in memory of our deeply-lamented friend, Dr. James Fletcher. A meeting of the Ottawa Field Naturalists' Club was held on the first of December, and appreciative addresses were given by many colleagues and friends, all expressive of the highest admiration for his varied scientific attainments and the warmest affection for him whose kindness, geniality and unselfishness won the hearts of all who knew him. Mr. W. H. Harrington, an almost life-long companion, gives a most interesting account of their early days together, when they explored forest and field and stream collecting insects and plants, and how the intimate knowledge of nature thus obtained caused him to become such a recognized authority in both botany and entomology. All these addresses will be read with the deepest interest by the many friends of him whom they commemorate.

HONOLULU, HAWAIIAN ISLANDS.

About the middle of May the Hawaiian Board of Agriculture and Forestry hope to be in a position to engage an assistant entomologist. They want an economic entomologist inclined to take up Coleoptera or Parasitic Hymenoptera as a specialty, and one who is good at laboratory and field work. Their equipment and library are good. Salary \$1,500 to \$1,800 per annum, depending upon the man. The climate of Hawaii is unexcelled and opportunities good. Correspondence might be opened now. State age, schools, experience; also give references. Address: JACOB KOTINSKY, Superintendent of Entomology, Board of Agriculture and Forestry, Honolulu, Hawaii.

Mailed February 6th, 1909.





BASILARCHIA ARCHIPPUS, VAR. LANTHANIS.
(COOK AND WATSON.)

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No. 3.

A VARIETY OF BASILARCHIA ARCHIPPUS.

BY JOHN H. COOK AND FRANK E. WATSON, ALBANY, N. Y.

Basilarchia archippus, new variety, *lanthanis*.*—Differs from *archippus* proper in that the extramesial black stripe crossing the secondaries is, on the upper surface, subobsolete.

The type specimen (Pl. 5, fig. 2) was taken at Albany, N. Y., in June, 1902. The paratype, illustrated (fig. 1), came from Hudson, N. Y. These butterflies are representative of a series of twelve, eleven of which are still in the possession of the authors. More than a score of others have been seen within the last ten years, and intergrade forms are common.

While in general opposed to the practice of designating a form as a variety merely because it differs more or less strikingly from an arbitrarily assumed norm, we have considered that in the present instance an exception should be made. The value of a name is measured by its usefulness, and should *lanthanis* prove to merit the attention of no one but the catalogue-maker, it will be justly ignored. If, however, the loss of the black stripe is a logical step in the evolution of the wing design of *archippus*, whereby its mimicry of *Anosia plexippus* becomes more complete, the existence of this variety may be a fact of more than ordinary biological interest.

The problem which the species presents will be discussed in a paper soon to appear in the Proceedings of the Entomological Society of London, and as a distinctive name for the stripeless variety will facilitate that discussion, it was thought advisable to publish this brief description in advance.

SOME NEW NORTH AMERICAN JASSIDÆ.

BY E. D. BALL, LOGAN, UTAH.

Phlepsius attractus, n. sp.—Resembling *floridanus*, but with an evenly rounding vertex and a smaller number of spots on the costa. Length, ♂ 4.25 mm.

Vertex twice wider than long, scarcely half the length of the pronotum, margins parallel, the anterior one rounding evenly to the front

**λανθάνω*.—I escape notice.

through its entire length. Front regularly tapering to the wedge-shaped clypeus. Pronotum set into the head as in *floridanus*.

Colour: Vertex pale creamy, an oval brown spot on either side the disc connected to the posterior margin by a line. Pronotum and scutellum milky, sparsely mottled with brown. Elytra milky, sparsely reticulated with brown, a few darker spots along the margin, and number of milky spots on the disc. Face finely irrorate with pale tawny.

Genitalia: Male valve broad and short, bluntly rounding; plates small, margins slightly concave, their rounding apices upturned, about three times the length of the valve. Disc of the plates ivory-white, polished.

Described from two males from Florida, from Mrs. Slosson. This species approaches *costomaculatus* in the shape of vertex and the lack of dark ornamentation, but is quite distinct in other characters.

Phlepsius floridanus, n. sp.—Resembling *irroratus*, but smaller, form of *pulchripennis*, but with a longer vertex and about seven spots on costa. Length, ♀ 5 mm.

Vertex twice wider than long, half the length of the pronotum, a trifle longer on middle than against the eye, disc almost flat, margin rounding to front except for the slightly conically-produced apex, front broad above, almost regularly narrowing to the clypeus. Pronotum long, more than half its length within the curve of the head. Elytra long, appressed, venation as in *irroratus*.

Colour: Vertex coarsely irregularly inscribed with tawny brown, a circle around each ocellus, a spot on the apex of vertex, a dash on either side, a crescent on the disc connected with the apex by a line and four points on the posterior margin ivory-white. Pronotum obscurely mottled with brown and white. Scutellum soiled yellow, with three ivory points. Elytra milky, sparsely but rather evenly reticulate with tawny, about seven dark spots along costa. Face finely irrorate with tawny, a few spots above and short arcs below ivory-white.

Genitalia: Female segment rather long, rounding posteriorly, with a pair of small rounding lobes on the median fourth.

Described from a single female from Biscayan Bay, Florida, from Mrs. Annie Trumbull Slosson. This species is intermediate in character between the *costomaculatus* group and the regular Phlepsids, but probably belongs with the former.

Phlepsius tubus, n. sp.—Resembling *fuscipennis*, Van Duzee, but smaller and stouter, with a narrower vertex and more of a tawny fulvous shade. Length, 5.25 mm.

Vertex rather narrow, slightly longer than in *fuscipennis*, parallel-margined and slightly depressed. Anterior margin merged with front, except for a slight production at apex. Front broad and short as in *fuscipennis*. Pronotum slightly wrinkled in the female, distinctly so in the male. Elytra broad and slightly flaring.

Colour: Vertex, pronotum and scutellum fulvous, irrorate with tawny, the posterior disc of pronotum and a cloud on scutellum darker. Scutellum with the tip and a pair of lateral spots ivory-white, the lateral spots pointed behind and exceeding the line of the margin. Elytra finely reticulate and slightly irrorate with tawny. A few irregular darker spots on the margin and paler ones on disc. Face finely irrorate with pale tawny, without markings.

Genitalia: Female segment broad and rather short, posterior margin divided into four evenly rounding lobes equal in length, the median pair slightly broader than the lateral ones, and black margined, median cleft slightly deeper than the lateral ones. Male: valve long, triangular, plates strongly gibbous at base, margins slightly narrowing to the broad, roundly truncate tips; together forming a broad blunt-tipped spoon, scarcely as long as its basal width, and only equalling the tubularly inflated pygofers.

Described from a single pair taken at Washington, D. C. This species, *pusillus*, and the following one connect the *Uhleri* group with the more typical *Phlepsiids*.

Phlepsius utahnus, n. sp.—Resembling *pulchripennis*, but smaller, lighter coloured, and with a longer, narrower vertex. Length, ♀ 5 mm.; ♂ 4.5 mm.

Vertex obtusely triangular, as long as the basal width, and almost as long as pronotum, one-third longer on middle than against eye, disc flat, margin bluntly rounding to the front. Front long, narrow and parallel-margined above, narrowing below to the slender parallel-margined clypeus. Elytra long and narrow, venation obscure and somewhat irregular.

Colour: Vertex yellow, ocelli and four points on anterior margin tawny or brown; disc with a large black spot, concave in front except for a triangular incision on the median suture, pointed behind where it reaches the base, the surface finely irrorate with yellow. Pronotum irregularly irrorate with brownish fuscous. Scutellum yellow, a pair of quadrate reticular areas inside the basal angles and a pair of round dots against apex, black. Elytra milky, the nervures pale tawny, surface

irregularly irrorate and sparsely reticulate with brownish-fuscous. The reticulations are gathered into several more or less definite spots along posterior half of costa and one in the inner anteapical cell. The clavus and adjacent parts of corium with a number of irregular translucent ivory-white areas. Face finely irrorate in the male, sparsely so in the female.

Genitalia: Female segment short and truncate, slightly medianly carinate, pygofer short and stout; male: valve long, roundly pointed, the lateral margins concave at base, plates together equilaterally triangular, twice the length of the valve.

Described from three specimens from "Chads," Utah. A male from Arizona and a female from California probably belong here, but are not in shape to definitely determine.

Phlepsius tigrinus, n. sp.—Resembling *tubus* and *Uhleri*, but larger and darker. Tawny brown, with sparse reticulations on elytra. Length, ♀ 6 mm.

Vertex three times wider than long, slightly sloping, the posterior margin elevated, anterior margin rounding in front, almost parallel with posterior one; apex scarcely produced. Front broad, the margins almost straight. Pronotum smooth. Elytra moderately long, distinctly flaring.

Colour: Vertex tawny fulvous, pronotum tawny brown, with the anterior margin shading to the colour of the vertex, and the disc irrorate with milky white. Scutellum pale yellow, the basal angles irrorate with tawny, and the apical third shading to ivory-white. Elytra very sparsely reticulate and closely, finely irrorate with tawny. The irrorations omitting a few irregular areas.

Genitalia: Female segment broad and short, about twice the length of the preceding, the posterior margin slightly emarginate, with the median third weakly produced and dark margined.

Described from a single female from Washington, D. C. This species shows traces of the banding of *Uhleri*, but is easily separated by the larger size and distinct genitalia.

Eutettix (Mesamia) illumina, n. sp.—Short, stout, black, with a hyaline band before apex of elytra. Length: ♂ 4 mm.

Vertex hardly twice wider than long, anterior margin slightly more rounding than posterior, disc slightly sloping to the definite anterior margin. Front convex, broad above, margins straight, narrowing to

clypeus. Pronotum finely wrinkled, elytra moderately long, widely flaring at the apices, venation obscure at the base, central anteapical cell irregularly reticulate. Male: valve small, triangular; plates triangular, twice the length of the valve.

Colour: Deep shining black; a narrow line on the vertex margin ivory-white, a band across the elytra before the apices, including the apex of clavus and bases of the four apical cells, milky hyaline, this band broken into irregular, more or less oval spots by the black nervures, the largest spot being in the fourth apical cell. Below black; the legs creamy yellow, dorsal surface of posterior pair lined with black.

Described from a single male from Arizona. In structure this species seems to be intermediate between the *nigrodorsum* and *vitellina* groups, so it does not fit well in either. In colour it is far removed from anything in the genus.

Eutettix (Mesamia) animana, n. sp.—Form of *Johnsoni* nearly, smaller and darker, with the nervures distinct. Length, ♂ 5 mm.

Vertex with the disc flat, anterior margin a trifle more curved than the posterior, passage to front more rounding than in *Johnsoni*, front as in that species. Elytra long, slender, appressed, venation distinct, the second cross nervure often rudimentary or wanting, central anteapical cell long, constricted in the middle.

Colour: Vertex creamy yellow, six black dashes in pairs on the anterior margin, pronotum mottled with milky and brown, yellowish in front. Scutellum creamy yellow, transverse impressed line black. Elytra subhyaline, faintly washed with tawny brown, nervures brown, becoming darker on the costa; a pair of oval, milky-white spots beyond the middle of the clavus. Face dirty yellow, a spot above the antennal ledge and a broken line in front, just beneath the vertex margin, black.

Genitalia: Male, valve large, triangular, with apex blunt, plates rapidly roundly narrowing for half their length, then gradually tapering to the rounding points, apical portion convex in both diameters.

Described from a single male taken at Animas, near Durango, Colorado, by the writer. It is intermediate in appearance between *fenestrata* and *Johnsoni*, but quite distinct in structure from either.

Eutettix (Mesamia) aurata, n. sp.—Form of *Johnsoni* nearly, smaller and paler. Golden yellow, without definite markings. Length, ♀ 4.5 mm.

Vertex slightly sloping, almost parallel-margined, passage to front slightly rounding. Front broader at base than in *Johnsoni*. Elytra

moderately long and slender, venation indistinct. Female segment short, the posterior margin in the form of an obtusely angled triangle, with the apex slightly produced, the pygofers short and stout.

Colour: Pale golden-yellow, the elytra coriaceous and uniform in shade with the rest of the body. The anterior margin of vertex with an ivory line, behind which there are faintly indicated in brown the six points usual in this group. Face and below yellow, traces of alternate light and brown arcs on disc of front.

Described from a single female from Washington, D. C. This is by far the smallest member of this subgenus, and will be readily recognized by its uniform golden colour and distinct genitalia.

Eutettix amanda, n. sp.—Form of *Mildredæ* nearly, smaller, paler, with oblique brown markings on elytra. Length, ♀ 5 mm.

Vertex convex, margin rounding to front except at the apex, which is bluntly conically pointed. Front narrower than in *Mildredæ*, margins sloping directly into clypeus. Female segment moderately long, posterior margin rounding, median fifth slightly excavated, with a broad blunt tooth exceeding the margin by half its width.

Colour: Vertex creamy, with two irregular oval spots on the disc pale tawny. Pronotum milky, clouded with pale greenish fuscous, except for a broad median stripe, which becomes ivory-white on the scutellum, where it includes all but the brown basal angles. A transverse brown dash inside and behind either eye, with a line extending in towards the centre of the pronotum. Elytra pale, with a faint brown wash, and heavy brown or fuscous markings, as follows: the scutellar and sutural margins of clavus before the middle, the apex of clavus, a spot near base of corium, an oblique dash before the middle in line with the apex of clavus, a transverse band on second costal nervure, and a cloud on the apex. All of the brown markings, except at base and apex, are irregularly margined with ivory-white. Face dirty yellow, pygofers castaneous.

Described from a single female from Arizona. This is a new and quite distinct addition to the handsome species of this group.

Scaphoideus Catalinus, n. sp.—Form of *blandus* nearly, smaller, and with a shorter vertex. Tawny yellow, with two white bands on elytra. Length, ♀ 4 mm.

Vertex roundly rectangular, as long as its basal width, and almost equalling the pronotum, disc flat or slightly depressed. Elytra short, stout, Platymetopius-like in form and venation, second cross nervure

present, and a number of reflexed veinlets to the costa. Female segment short, lateral angles rounding, posterior margin rounding, with a deep, narrow, median slit extending almost to the base.

Colour: Vertex and pronotum lemon-yellow, a pair of faint stripes adjoining the median line on disc of vertex, and a few milky irrorations on disc of pronotum. Scutellum orange, with three ivory points on apical portion. Elytra milky, washed with pale brown, omitting a definite band across the second cross nervure, and an irregular broader one before apex. Nervures brown, shading to black on the white bands, and reflexed veinlets.

Described from a single female from near the Catalina mountains, in Arizona. In venation and general appearance this species approaches the genus *Platymetopius*, but it lacks the structure of vertex and front found in that genus, and seems more closely related to *blandus* and its allies.

Scaphoideus pellucidus, n. sp.—Size and form of *blandus* nearly, darker, and with a much longer vertex. Length, ♀ 5.75 mm.; ♂ 5 mm.

Vertex strongly, acutely angular, the margins straight, and the disc flat or slightly depressed, distinctly longer than the pronotum. Head, as seen from the side, with the vertex margin produced and foliaceous. Front concave above, convex below, broad above, margins angularly narrowing to the antennæ, then gradually sloping to the constricted clypeus. Elytra long and slender, venation obscure, spaces between the nervures and along the margins irregularly divided by cross nervures and pigment lines.

Colour: Vertex lemon-yellow, the margins before the eyes and the median line narrowly white and closely lined with black, usually a pair of broad sanguineous stripes outside the median black ones, and often extending across the pronotum in highly-coloured specimens. Pronotum olive-brown on disc, mottled with milky, anterior margin shading to yellow. Elytra washed with iridescent olive brown, becoming fuscous toward the apex and costa. Whole surface interspersed with numerous irregularly oval pellucid spots in sharp contrast.

Genitalia: Female segment moderately long, posterior margin rounding, with the median fourth roundly produced and semicircularly notched; male: valve obtusely triangular, plates gibbous at base, then triangularly produced, with the apices acute.

Described from eight examples from Stanford and Colfax, California. The foliaceous vertex renders this a strikingly distinct species in the genus.

Scaphoidens scrupulosus, var. *reductus*, n. var.—Form of *scrupulosus*, but smaller, and entirely lacking the brown banding of that species. Length, ♀ 4.5 mm.

Vertex pale creamy, with a pair of large quadrate spots on the disc, separated by their width and connected by a line along the margins to a pair of round spots against the eyes, black. Pronotum milky, mottled with fuscous. Elytra milky, finely and uniformly reticulate with fuscous, apical cells black, with ivory spots at base. Female segment more rounding than in *scrupulosus*, with a shallower notch and a long strap-shaped tongue extending two-thirds its length beyond the segment.

Described from three females from Colfax, California. The specific limitations in this genus are very difficult to determine. A study of a larger series may prove this to be a distinct species, but the present material will hardly warrant its recognition.

DISSECTING SMALL BEETLES.

Prof. Wickham's article in the January issue of this magazine on "The Preparation of Beetles for the Microscope," is an excellent one, which, had it appeared ten years ago, would have saved to many of us a great deal of trouble and spoiled specimens.

In connection with this subject I should like to say a few words about my method of dissecting very small beetles of the Staphylinid subfamily Aleocharinæ.

I do not dissect the specimens first, and do not subject them in parts to the effects of the different fluids, but put the whole specimens in alcohol, then in concentrated carbolic acid solution, then in oil of cloves. The specimens go from the last named medium on a cover-glass; there I first cut the head off and transfer it to the cover-glass of the permanent mount, where, with very fine needles, the parts of the head are dissected and placed in proper position.

The prothorax and front legs are then transferred similarly to another cover-glass, and finally the meso- and metasternum (minus wing-covers and wings) to a third cover-glass, sometimes the abdomen to a fourth glass.

As dissecting instruments I use two steel needles, which are fastened in handles and then sharpened under the hand-lens. They are sharpened so that they represent a miniature double-edged flat scalpel with very sharp point.—A. FENYES, Pasadena, Cal.

NEW SPECIES OF EXOTIC LEPIDOPTERA.

BY GEORGE A. EHLMANN, PITTSBURG, PA.

Papilio echo, n. sp.—Male. Closely allied to *P. bootes*, Westw. The outlines of all the wings are the same as in *P. bootes*, but the whitish-crimson spots in the tails are absent; the crimson lunated spots on the upper side of the hind wings that are so prominent in the latter are very small, almost wanting. On the under side of the secondaries the lunated spots at the anal angle are smaller and more separated than in *P. bootes*; in the upper median cell there is a faint reddish streak, whilst in *P. bootes* there is a large, well-developed semi-lunated white spot; the two white discal spots on the secondaries are smaller; the red or crimson area at the base of both pairs of wings on the under side is also smaller; the tails are a little longer, but not as long as they are in *P. lama*, Oberth, or *P. janaka*, Moore.

Exp. 5 inch. Hab.: Khasia Hills, British Burmah.

Type in my collection.

This species is very interesting, as belonging to the *bootes* group. It lacks that important character of having the spots in the tails. The type of this species came into my possession through the late Bernhard Gerhard.

Papilio ikusa, n. sp.—Male allied to *P. menicius*, Feld., but not so large; the scaling is less dense on all the wings, which gives it a semi-transparent appearance; the red collar at the back of the head is wanting; the red between the eyes is replaced by black; the dentations of the hind wings are more sharply defined; the tails are not so long and less spatulated, and on the upper side of the hind wings, in the upper, median and lower cells, there is an ill-defined orange spot on each near the outer margin.

The ground colour on the under side is much lighter than above, and the crimson lunated spots that are so prominent in *P. menicius* are here replaced on the submarginal space by seven round orange-coloured spots; anal valves are also orange.

Type in my collection.

Exp. 3 in. Hab.: Simoda, Japan.

I received this species from the Rev. Mr. Loomis, of Yokohama, Japan, with the above locality attached to it. In studying this singular form, the only conclusion that I can arrive at is that we have another race

March, 1909

to contend with in the mountains of Central Japan that bears a similar relation to *P. alcinous*, Klug., and *P. menecius*, Feld., as we find in *P. lama*, Ober.; *P. plutonius*, Ober., and *P. janak*, Moore.

Papilio potamonianus, n. sp.—Male allied to *P. laterillianus*, Godt., and *P. cyrnus*, Boisd., but smaller. On the upper side of the fore wings there is a series on the submarginal space of fourteen small canary-green (or yellow) elongated spots; in *P. cyrnus* there are only seven, but they are larger; the outer spots in the discoidal cell are differently shaped, especially the larger spot, which is shorter and broader; there are also two additional small, roundish spots at the inner end of the large spot (sometimes one of these spots is present in the same position in the female of *P. laterillianus*). The hind wings have the outer margin more pointed in the middle than either of the above species, and on the under side the most notable features are the heavy cast of crimson at the base of both pairs of wings, and the very light brown shading on the outer margin of the hind wings.

Exp. $3\frac{1}{2}$ in. Hab.: Upper Congo, W. Africa.

Type in my collection.

I dedicate this handsome specimen to Potamon, the founder of the great schools at Alexandria, in ancient Egypt.

Eudamus Boisduvalii, n. sp.—Male allied to *E. antaus*, Hew. The ground colour on the upper side of all the wings is a uniform brown; in the middle of the costa there is a small orange spot, below this there is a truncate yellowish semitransparent spot; in the limbal area there are three small round spots of the same colour; on the lower submarginal vein just below the limbal area there is a well-defined orange spot.

Hind wings: In the median cell of the outer submarginal space there are two small elongated orange spots; all fringes light buff; the under side of palpi is light brown; thorax and legs reddish-brown; abdomen buff, with a faint brown lateral band. Under side of fore wings the same as above, but much lighter; on the under side of hind wings the ground colour is a rich chocolate-brown, and across the disc there are two silvery-white bars, in the outer bar the two orange spots so conspicuous above are here repeated.

Exp. $2\frac{1}{8}$ in. Hab.: Suapure, Venezuela, S. America.

Type in my collection.

Captured on Nov. 4th, 1899, by Mr. Edw. A. Klages. All the species of Lepidoptera so far described from Suapure, Venezuela, S. A.,

by the writer, were collected by Mr. Klages, who endured much privation and suffering during his expedition along the Orinoco river, which hindered him greatly in procuring a large number of specimens; nevertheless, he can rest with the satisfaction that the number of species collected by him more than repay the difficulties encountered.

Achylodes heros, n. sp.—Male. This species is intermediate between *A. sebalus*, Fahr., and *A. melander*, Cram.; the ground colour is much lighter brown than either of the above-mentioned species on the upper side; also the discal black bands are more widely separated; the outer marginal band is very narrow.

On the upper side of the hind wings the most conspicuous character is the large bright buff lunated spots in the anal angle. On the under side of the fore wings the ground colour is much paler than above; the markings are very close to those of *A. melander*. Under side of the hind wings much the same as in *A. melander*, except that the anal angle is buff instead of orange, and the abdominal margin is also orange in colour, which extends to the base of the wing.

Exp. one inch and seven-eighths. Hab.: Suapure, Venezuela.

Type in my collection.

Sphingicampa Smithii, n. sp.—Male. Head pale buff; antennæ brown; upper side of the thorax pale brown, which colour grows lighter as it extends towards the tip of the abdomen, where it is a pale buff on the last three joints.

Fore wings of a uniform chestnut brown along the costal area; the outer margin and inner space to the base of the wing have a purplish cast, and through this space there are three pale brown bars, beginning at the lower side of the discal cell, and extending to the inner margin. The hind wings are pale brown, the basal area is much lighter. Under side of the fore wings is yellowish, with a suffusion of brown; the costal and outer margins are tinted with purple; under side of the hind wings is uniform pale buff; the thorax, abdomen and legs are also buff.

Exp. two and one-eighth inches. Hab.: Rio Janeiro, Brazil, S. America.

Type in my collection.

This fine moth was captured by Herbert T. Smith in the latter part of November, 1888, and Mr. Smith has informed me that this specimen was the only example seen during all his rambles in South America.

NOTES ON TENTHREDINOIDEA, WITH DESCRIPTIONS OF
NEW SPECIES.

BY S. A. ROHWER, BOULDER, COLO.

(Paper III.)

Pteronus Cockerelli, n. sp.—♀. Length, 6 mm.; length of anterior wing, 6 mm.; length of antennæ, 5 mm. Head and antennæ shining; sparsely, finely punctured. Clypeus distinctly circularly emarginate; lobes rather broad triangular, obtuse at apex. Antennal foveæ small, not very distinct. Middle fovea deep, oval, wall rather pointed toward the clypeus. Side walls of the ocellar basin sharp, strong. Frontal crest strong, slightly broken in the middle. Lateral ocellar furrows broad, shallow. Antennæ long, third and fourth joints equal; apical joint slightly longer than the preceding one. Maxillary palpi long; last two joints equal, the third from apex the shortest; third joint subclavate toward apex. Claws deeply cleft, teeth equal; the inner tooth is perhaps a little the stouter. Basal joint of hind tarsi a little longer than 2 + 3. Venation normal; the first transverse cubitus faint; third cubital cell not unusually broader at apex than at base; upper discal cell of hind wing exceeding the lower on the outer margin. Stigma short, very broad, ovate, rounded at apex; not quite twice as long as broad in the widest part. Sheath broad, short, obliquely truncate at the apex; marginal hairs very minute. Cerci short, stout. Head reddish-brown, with a black spot around the ocelli. Thorax, except the angles of pronotum and tegulæ which are pallid, and the lateral lobes of mesonotum posteriorly and scutellum which are brownish, *black*. Abdomen, except basal plates and basal part of first segment and apex of sheath which are black, *reddish-brown*. Four anterior legs, coxæ, trochanters and basal half of posterior femora *pallid* (the anterior femora are slightly reddish). Apical half of posterior femora, apex of posterior tibiæ and their tarsi *black*; basal two-thirds of posterior tibiæ *reddish-brown*. Antennæ, except two basal joints, bright *rufo-ferruginous*. Wings yellowish-hyaline, iridescent; venation dark brown, costa somewhat and extreme basal part of stigma pallid.

Habitat.—Campus of University of Colorado, Boulder, Colo., August, 1908. Collected by Prof. T. D. A. Cockerell, to whom I take great pleasure in dedicating this pretty species.

In Marlatt's Revision of the Nematinae of N. America, this species runs to *tricolor*, Marl. (New Hampshire), but it differs as follows from his

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description of that species : Length, 6 mm.; frontal crest slightly broken ; middle fovea ovate ; third cubital cell not twice as wide at the apex as at the base, and the head is much paler. Marlatt does not say anything about the colour of the antennæ in *tricolor*, but they are probably black, as he would have undoubtedly have mentioned such bright red ones as *Cockerelli* has.

Blennocampa Gillettei, Weldon (CAN. ENT., Sept., 1907, p. 304).—♀. Length, 6 mm. Clypeus hardly emarginate, rather rounded at apex. Ocellar basin well defined, the upper wall more prominent ; middle fovea large, deep, well defined. First antennal joint longer than second ; third nearly as long as 4 + 5. Hind basitarsus as long as 2 + 3 + 4. Tarsal claws short, with a large tooth and a smaller posterior one ; pulvilli large. Scutellum shining, with a few large punctures posteriorly. Transverse radial in the apical fourth of cell ; at a different angle from the third transverse cubitus ; third cubital cell almost twice as broad on apical margin as at base ; posterior wings with one discal cell. Sheath stout, broad, sharp on upper apical margin, rounded on lower. Colour shining black ; edge of pronotum, tegulæ, legs below knees, pallid ; middle tarsi slightly infuscate, the posterior ones more strongly so. Wings dusky-hyaline ; nervures black, lower half of stigma paler.

Habitat.—Ft. Collins, Colo., May 15, 1892 (C. P. Gillette). On raspberry.

Notes from the type. Probably belongs to *Neocharactus*, MacG.

Neocharactus Californicus, n. sp.—♀. Length, 7 mm. Clypeus truncate, roughened like the rest of the head. Head with large confluent punctures ; cheeks shining, with small, sparse punctures. Pentagonal area wanting ; a slight depression around anterior ocellus. Lateral ocellar furrows rather broad and shallow to level of ocelli ; wanting below ocelli. Middle fovea large, basin-like, U-shaped, open at the bottom. Thorax above rugose ; scutellum with large punctures and small rugæ. Pleura shining, almost impunctate. Stigma broad, rounded on the lower margin, slightly broader at the base. Transverse radial curved, joining the radius at about the apical fourth of the third cubital cell. Inner claw-tooth rather large, nearer the base of the claw is another small tooth. Abdomen shining. Sheath parallel sided until near the apex, where both sides taper to an obtuse apex ; black, with a more or less dark blue-metallic tint. Apical and lower margins of the sheath testaceous. Legs below the knees creamy-white ; apices of tarsi and tibiæ somewhat dusky ; claws piceous.

Wings yellowish-hyaline ; nervures and stigma dark brown ; rather densely covered with short gray hair.

Habitat.—Palo Alto, California, Feb. 29, 1892. Received from R. W. Doane.

The innermost tooth of the claw is rather small, and there is a little doubt in my mind whether this species should be placed in the genus *Neocharactus*, MacG. However, it seems to be related to *N. Bakeri*, and may well be placed with it. Dr. MacGillivray does not give the sex of his specimens. I judge they are males. If this is the case, *Californicus* may be the ♀ of *Bakeri*, but it differs as follows from Dr. MacGillivray's description : Head, thorax and abdomen without white markings ; head coarsely punctured ; the middle fovea not "twice as long as broad," and the wings yellowish.

The third antennal joint is about as long as $4 + 5$.

Monophadnus multicinctus, n. sp.—♂. Length, 8 mm. Clypeus truncate, in the middle very narrowly, slightly notched ; rugose. Superclypeal suture rather strong. Middle fovea elongate transversely, with a branch on each side, which extends to the lateral ocellar furrows, which are strong, and extend to the level of the antennæ. Ocellar basin triangular, along each upper side is a faintly-indicated furrow ; at the apex these furrows join and extend backward to the occiput. The transverse ocellar furrow is faintly indicated. Head around the ocelli punctured, the rest reticulate. Antennæ robust, third joint as long as $4 + 5$; joints four, five and six constricted at the base beneath. Thorax (including scutellum) above with shallow, irregular punctures. Scutellar appendage highly polished, not at all carinated. Pleura shining. Stigma broad at base, acuminate at apex. Tran. radial interstitial, or nearly so, with the third tran. cubitus. Legs rather hairy. Claws simple. Abdomen shining, black : pronotum, tegulæ luteo-testaceous ; cenchri, edge of basal plates in the middle, edge of all the dorsal and ventral abdominal segments narrowly white. Extreme apex of femora, basal part of tibiæ pallid ; rest of legs below femora strongly infuscated. Wings hyaline, iridescent ; venation dark brown, lower half of stigma pallid.

Paratype differs from the type as follows : Smaller, 6.5 mm. ; the pronotum is black, and third antennal joint is slightly emarginate beneath.

Habitat.—Type, Washington, D. C., May 6 (N. Banks) ; paratype, Falls Church, Va., April 27 (N. Banks).

Related to *M. tilia*, Nort., from which it may be separated by the truncate clypeus, white bands of the abdomen and other characters.

Labidia Doanei, n. sp.—♀. Length, 6.5 mm.; robust. Clypeus large; very slightly, broadly emarginate; punctured like front. Labrum rounded at the apex, rather large. Head closely, rather coarsely punctured, cheeks not so strongly so. Lateral ocellar furrows more or less distinct from occiput to antennæ. Middle fovea indicated by a shallow circular impression. Antennæ as usual for genus; third joint as long as 4 + 5. Thorax not as coarsely punctured as the head. Stigma rounded on the lower margin, a little broader at the base. Third cubital cell as long on the cubitus as the length of the third transverse cubitus; about a third longer at apex than at base. Claws deeply cleft, teeth equal. Basal plate not divided in the middle, or, at least, not strongly so. Sheath straight above, rounded below, but not strongly so, *black*. Palpi, tegulæ, angles of pronotum, scutellum sometimes, apical margin of basal plates, apical margin of dorsal and ventral abdominal segments and the sides of all the segments *creamy-yellow*. Legs mostly *creamy-yellow*, but the following are black: coxæ, trochanters, a line above on the femora and tibiæ (sometimes interrupted on the tibiæ), and the tarsi, except beneath on the anterior ones sometimes. Wings hyaline, slightly iridescent; venation dark brown, the costa and stigma reddish-brown.

Habitat.—California. Specimens from Stanford University, March 9, 1905; Palo Alto, March 31, 1893, and April 27, 1895.

Named in honour of R. W. Doane, who kindly sent the specimens.

This species is at once known from *L. originalis*, var. *opimus*, Cress., by the smaller size, the black and almost truncate clypeus, the broader and more rounded stigma (the stigma of *opimus*, Cress., is rather slender and elongate), the shorter third cubital cell and other characters.

Labidia originalis, var. *opimus*, Cress.—I have examined specimens of this species from the following localities: 20 ♀ ♀ above Silverton, Colo., July, '03, alt. 12,000 ft. (C. R. Jones); ♀, Graymont, Colo., July (C. P. Gillette); Steamboat Springs, Routt Co., Colo., July (C. P. Gillette); ♀, Home, Colo., Aug.; Gore Pass, Colo. (C. P. Gillette); Cameron Pass, Colo. (C. P. Gillette); Little Beaver Creek, Larimer Co., Colo., alt. 9,100 ft. (C. P. Gillette). The above specimens are in the collection of the Colorado Agricultural College. ♀, Ute Creek, Costilla Co., Colo., alt. 9,000 ft., July 1, 1907; ♀, Russell, Costilla Co., Colo., July 12, 1907. The last two specimens are in the collection of the University of Nebraska. They were collected by H. S. Smith.

The above specimens vary a good deal among themselves ; some of the varieties are in colour the same as *originalis*, Nort., and as no structural character can be found to separate *opimus* from *originalis*, I think that they should be considered the same. The above specimens vary as follows: The abdominal bands form a narrow line to a rather broad band; the pleural mark frequently wanting ; the amount of black on the legs varies ; the scutellum in one case is black ; and the marks above the posterior coxæ are sometimes reduced.

This species has a very wide range in Colorado ; it ranges from the Upper Austral Zone to the Arctic Alpine. It was taken at Olympia, Washington, by T. Kincaid (MacG., CAN. ENT., Oct., 1893, p. 240).

PROTEMPHYTUS, new genus.

Head and thorax opaque, with dense, large punctures. Malar space distinct ; clypeus emarginate ; antennæ stout, moderately short. Tarsal claws simple, rather long. Fore wings with three cubital cells, the first long and receiving the first recurrent nervure a little beyond the middle ; second short, wider on the apical margin, receiving the second recurrent nervure about the middle. Transverse radial joining the radius beyond the second transverse cubitus. Hind wings without a discal cell ; lanceolate cell of hind wings shortly petiolate at apex. Species small.

Type *Emphytus coloradensis*, Weldon.

This genus contains so far only one species, *coloradensis*. It has the following bibliography :

Emphytus coloradensis, Weldon, [CAN. ENT., Sept., 1907, p. 304].

Original description.

Emphytus coloradensis, Roh. [CAN. ENT., June, 1908, p. 179], gives some notes to aid in determination.

Protemphytus is near to *Emphytus*, Klug, but may be separated by the opaque head and thorax, and the different position of the transverse radius.

Lyda nigripes, Cress.—I have seen a ♂ of this species from Calif., collected at Stanford University. It belongs to the genus *Lyda*, as restricted by Dr. Ashmead.

Lyda nigrita, Cress.—I have also seen a ♂ of this species collected at the same place as *L. nigripes*. It also belongs to the genus *Lyda* as restricted by Dr. Ashmead. Both were received from Mr. Doane.

ON THE GENERA VENUSIA, EUCHÆCA AND HYDRELIA.

BY LOUIS B. PROUT, LONDON, ENGLAND.

In Mr. Pearsall's valuable "Review of our Geometrid Classification—No. 3,"* a venational character is not mentioned, which—with the rarest possible exceptions, none being known to me save *Alsophila*—is as reliable as the structure of veins 5 and 8 of the hind wings, and which has been used as generic in the Larentiinae (= Hydriomeninae) by Hampson, and more recently by Dr. Turner in an able revision of the Australian genera of the subfamily.† I allude to the structure of the discocellulars of the hind wings. Ignoring minor variations which Mr. Pearsall might prefer to place in his "auxiliary group," there are two *essentially* different forms: (1) simple, or with a single angle inwards, marking the point of contact of the middle discocellular with the lower, vein 5 being in these cases either from the angle or from above it (or from the middle or above it where there is no appreciable angle); (2) biangulate, with vein 5 from the *lower* angle, thus from nearer (sometimes very much nearer) to 4 than to 6. The first form may be seen in *Eudule*, *Eupithecia*, *Xanthorhoe* (so far as it is homogeneous), and others, as well as in the vast majority of non-Larentiids; the second form in *Rachela*, *Oporinia* (= Epirrita), *Hydriomena* (except a few dissonant species which Hulst has included), *Marmopteryx*, and many others.

That this distinction is correlated with real phylogenetic differences, I have little doubt. Several "genera" of Guenée, upon whose system I worked in my early days, and which dissatisfied me profoundly on larval grounds, have proved to divide very satisfactorily with the aid of the discocellular character—for example his *Melanippe* and *Anticlea*.

Now, it happens that *Euchæca* (type *obliterata*, Hufn.) and *Hydrelia* (type *testacea*, Don.) fall into group 1 (with discocellulars simple), and *Venusia* (type *cambrica*, Curt.) into group 2. There was much discussion on the American representatives of these a few years ago, and much useful revision was done, notwithstanding some regrettable differences of opinion. But no one seems to have noticed that *cambrica*, Curt.; *comptaria*, Walk.; *Pearsalli*, Dyar, and *duodecimlineata*, Pack. (= *unipecta*, Pearsall), which are so much alike superficially, all agree in the hind wing venation (discocellulars biangulate), while *lucata*, Guen., and the much-enduring

*CAN. ENT., Vol. 39, page 91.

†Proc. Roy. Soc. Victoria, Vol. 16 (New Series), page 218.

species which Mr. Pearsall named *exhumata*, but now tells us should be called *inornata*, Hulst (the *perlineata* of the figures in Packard's Monograph), belong to the *other* group (discocellulars simple), as typified by the European *testacea*—to which, moreover, the said "*exhumata*" bears an extremely close superficial resemblance. Would it not be better to group the species after this stable character than after the secondary sexual one of the male antennæ?

I may add here that I think Meyrick was wrong in sinking *Hydrelia* to *Euchaca*, the whole *habitus* of the latter (unrepresented in America) suggests that it is *sui generis*, though I have not leisure to work out its character exhaustively, and only mention that vein 5 of hind wings is usually much nearer to 6 than to 4, cell very short, etc.

The species 3329 to 3336 in Dyar's List should, it seems to me, be distributed as follows :

VENUSIA, Curtis.

Section I.—♂ antennæ bipectinate.

3329. *cambrica*, Curtis.

Section II.—♂ antennæ unipectinate.

3330. *duodecimlineata*, Packard.

Section III.—♂ antennæ shortly ciliated.

3331. *comptaria*, Walker (not of Hulst?).

3331. (1) *Pearsalli*, Dyar (præc. var.?).

TRICHODEZIA, Warren.

3332. *albovittata*, Guenée.

3333. *Californiata*, Packard.

(3334 goes to *Eupithecia*.)

HYDRELIA, Hubner.

3335. *lucata*, Guenée.

3335. (1) *perlineata*, Auct. (Packard pro parte), = *inornata*, Hulst,
(fide Pearsall) = *exhumata*, Pearsall.

3336. *albifera*, Walker.

The value of this character lies largely in the ease with which it can be observed, even by those who are not well accustomed to close study of structure; and I would point out that if, as has been suggested (though to me it seems well-nigh unthinkable), confusion ever really arises between worn specimens of *comptaria* and "*inornata*," it can instantly be set at rest in this way.

A REPLY TO MR. KIRKALDY.

BY W. L. DISTANT, LONDON, ENGLAND.

For some time past Mr. Kirkaldy has employed his leisure at Honolulu by paying much attention, in the CANADIAN ENTOMOLOGIST, to myself and my writings. It is beyond my desire to reply to his critical opinions, but as regards the accuracy of some of his assertions, I must enter my protest, as I have previously been compelled to do in the pages of the "ENTOMOLOGIST" and the "Ann. Soc. Ent. Belg.," regarding similar misstatements made by the same writer in those publications.

In the CAN. ENT., XL, p. 453, Kirkaldy refers to *Chimarrhometra*, a genus founded by Bianchi on a species previously described by myself, and asserts with considerable disapproval that I "originally described the species as *Halobates*." This statement is entirely inexact. In 1879, probably before Mr. Kirkaldy had come under the care of his first schoolmaster, I enumerated and described the Rhyncheta collected by the late Dr. Stoliczka, during the Forsyth Expedition to Kashgar, in 1873-'74. In the same year I published some anticipatory diagnoses of species, among others, of *Halobates* (?) *orientalis*, of which I wrote: "I have placed this species provisionally in the genus *Halobates*, to which it has great affinity; its anatomical peculiarities and sexual appendages will hereafter be figured" (Trans. Ent. Soc. Lond., 1879, p. 126). A few months subsequently this promise was fulfilled (Sec. Yarkand Miss. Rhynch., p. 12, Plate), when I referred to it as "*Gen. (?) orientalis*," and stated: "I have refrained for the present from making a new genus for the reception of this species." At the same time, from the unique spirit specimens (2), Mr. Rippon, the artist, gave no fewer than *seven* enlarged sectional figures drawn by aid of the microscope. With these facts before him (which I presume he had, or should have had), I have a right to ask what justification Kirkaldy has for the misrepresentation in writing that I "originally described the species as *Halobates*."

Of the same writer's method in criticism, so far as I am concerned, and published in American publications alone, I will give one example. In the Trans. Amer. Ent. Soc. (1906), and in connection with a proposed revision of the Capsidæ, he (p. 134) placed the genus *Angerianus*, Dist., in a tribe he proposed as *Cyclapini*. On p. 146 he actually enumerated

the same genus under "Genera not described so as to admit of approximate location." I will not pursue the action further, but will simply ask, is this serious entomology? And when Kirkaldy remarks anent *Chimarrhometra* that my "descriptions and figures are quite untrustworthy" (CAN. ENT., XL, p. 453): I will ask, in reply, whether, on the above statement of fact, Mr. Kirkaldy is to be accepted as a trustworthy controversialist?

DESCRIPTION OF *PSILOCORISIS FLETCHERELLA*, A NEW SPECIES OF MOTH OF THE FAMILY CECOPHORIDÆ.*

BY ARTHUR GIBSON, CENTRAL EXPERIMENTAL FARM, OTTAWA.

In the CANADIAN ENTOMOLOGIST, March, 1908, the writer published, under the name of *Cryptolechia quercicella*, Clemens, a note on some larvæ, which had been found feeding on *Populus tremuloides*, in the Arboretum of the Central Experimental Farm, Ottawa. On further study the moth reared from these larvæ proves to be an undescribed species of the genus *Psilocorsis*, as mentioned by Mr. August Busck in the Proceedings of the United States National Museum, Vol. XXXV, p. 197, 1908. As a tribute to the memory of my late chief and ever kind friend, from whom I was always receiving the greatest encouragement and help in my studies, I esteem it an honour to name it

Psilocorsis Fletcherella, n. sp.—Alar expanse, 19 mm.

Labial palpi ochreous, margined beneath and on sides with longitudinal black lines, second joint thickened with appressed scales; antennæ simple, without pecten, black, annulated with light ochreous. Face and head rust-yellow; thorax darker, with a tinge of purple; abdomen almost concolorous with thorax, lower edge of segments pale ochreous. Fore wings of a pale gold colour, rather heavily dusted with pale brown and having a purplish reflection. Outer discal spot conspicuous, blackish, inner discal spot same colour, but not so well defined. Cilia ochreous, darkened with brown. Hind wings: ground colour same as fore wings, but only lightly dusted with pale brown. Legs bright pale ochreous, shining; tarsal joints fuscous.

Described from a single female specimen; the type, Cat. No. 12185, U. S. N. M.

*From the Ottawa Naturalist, Vol. XXII, No. 10, January, 1909, pp. 226-227.

NEW PHILIPPINE MOSQUITOES.

BY C. S. LUDLOW, PH. D.

Laboratory of the Office of the Surgeon-General, U. S. Army, Washington, D. C.

Among the collection received from the Philippines in the latter part of December, 1908, were several specimens belonging to Theobald's *Oculiomyia*, a peculiar and interesting genus, the small heads and large contiguous eyes suggesting some members of the family *Acroceridae*. The specimens sent are of a new species.

Oculiomyia Fulleri, n. sp.—♀. Head dark brown, covered with dark brown curved and forked scales, with a stripe of white flat scales laterad and brown flat scales ventrad, a few brown bristles projecting forward; antennæ brown, verticels and pubescence brown, the joints white, unscaled, basal joint testaceous; palpi brown, slender, about one-fourth the length of the proboscis; proboscis brown, slightly swollen toward the apex; clypeus brown; eyes brown, large, contiguous.

Thorax: prothoracic lobes dusky brown, practically nude; mesonotum dusky-brown, covered with brown scales and a few brown bristles; pleura testaceous, nude; scutellum brown, mid-lobe lighter, with brown curved scales; metanotum testaceous.

Abdomen brown, covered with dark brown flat scales; white lateral spots on some segments, in some specimens only on one segment, and that very indistinct, while on other specimens this spot is well and clearly marked on four segments; venter a silvery-yellow.

Legs: coxæ and trochanters light; bases and ventral aspect of femora whitish, otherwise the legs are entirely brown; ungues small, simple and equal.

Wings: membrane clear, veins with dark brown, almost black, scales, possibly partly denuded towards the base, but heavily scaled toward the apex, the scales much like *Teniorhynchus* wing-scales, but much narrowed at their bases; first submarginal cell longer than its stem, about the same width as and longer than the second posterior cell; cross-veins practically perpendicular to the long veins; the mid cross-vein not quite so long as the posterior, and the latter distant about once and a half its own length from the mid; halteres having light stem and fuscous knob.

Length about 6 mm., the proboscis itself being nearly 2 mm.

Habitat.—Parang, Mindanao, P. I. Taken Oct. 25, 1908.

The collections were taken by Major Fuller, Surgeon U. S. Army, and were very interesting, containing besides this new species the first specimens of *Culiciomyia inornata*, Theob., received from the Islands.

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NOTES ON SOME CHALCIDOIDEA.

BY J. C. CRAWFORD, BUREAU OF ENTOMOLOGY, WASHINGTON, D. C.

Megorismus Fletcheri, n. sp.—♀. Length, 1.50–1.75 mm. Bronzy-green; abdomen black, obscurely bluish or greenish; antennæ black, scape metallic; face in front of ocelli smooth, polished, the rest of the head reticulated; head and thorax with sparse long hairs, each set in a puncture; thorax reticulated, posterior margin of prothorax, parapsidal areas laterally, and scutellum back of the transverse furrow, smooth; metathorax rugose, with a short median carina and a smooth space on each side near the base; wings yellowish, nervures honey-colour; coxæ metallic, the rest of the legs testaceous; petiole stout, longitudinally rugose; abdomen smooth.

♂. Length, 1.50 mm. Similar to the female; the flagellum, however, light brownish.

Habitat.—Ottawa, Canada. Bred from *Nectarophora pisi*. (Arthur Gibson, collector.)

Type No. 12197, U. S. N. M.

Paratypes in collection Central Experimental Farm, Ottawa, Can.

Dedicated to the memory of the late Dr. Fletcher.

HEMADAS, new genus.

Type *Megorismus nubilipennis*, Ashm.

This genus belongs to the tribe *Metastenini*, Ashmead, and is distinguished by the following characters: Antennæ 13-jointed, with two ring-joints, mandibles two-toothed, clypeus at apex slightly emarginate, antennæ slightly clavate; marginal vein normal.

The following table, which includes the above new genus, will separate the females of the various genera assigned to the tribe by Dr. Ashmead, and correct some errors in the table given by him in the Classification of the Chalcidoidea:

- | | |
|--------------------------------------------|--------------------------------|
| 1. Last joint of antennæ spine-like..... | <i>Picroscytus</i> , Thoms. |
| | = <i>Stylophorella</i> , Ashm. |
| Last joint of antennæ normal..... | 2. |
| 2. Marginal vein thickened..... | 3. |
| Marginal vein not thickened..... | 4. |
| 3. Antennæ 13-jointed..... | <i>Xenocrepis</i> , Först. |
| Antennæ 12-jointed..... | <i>Disema</i> , Först. |
| 4. Antennæ with one ring-joint..... | <i>Arthrolysis</i> , Först. |
| Antennæ with more than one ring-joint..... | 5. |

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5. Antennæ with two ring-joints.....6.
 Antennæ with three ring-joints.....9.
6. Antennæ 12-jointed.....*Metastenus*, Walk.
 Antennæ with 13 joints.....7.
7. Clypeus with a median tooth.....*Hemitrichus*, Thoms.
 Clypeus without a median tooth.....8.
8. Mandibles three-toothed ; abdomen basally maculate with
 yellow.....*Dimachus*, Thoms.
 Mandibles two-toothed ; abdomen without yellow at
 base.....*Hemadas*, new genus.
9. Antennæ strongly clavate.....*Habritys*, Thoms.
 Antennæ not strongly clavate.....*Dinarmus*, Thoms.

All of the genera are said to have 13-jointed antennæ, with the exceptions of *Disema* and *Metastenus*. In specimens of *M. acanthocini*, Ashm., however, there are three ring-joints instead of two, making the antennæ 13-jointed, so that in the above table this species would run to the genus *Dinarmus*. The first ring-joint is so small that it is easily overlooked, as it was by Dr. Ashmead, and it is very likely that Walker has made the same mistake in the original description of the genus.

A NOTE ON THE HABITS OF APHILANTHOPS.

BY C. N. AINSLIE, BUREAU OF ENTOMOLOGY, WASHINGTON, D. C.

It has been for many years a matter of common knowledge that some fossorial wasps store their nests with various sorts of insects which they seize, carry away and place, in a disabled condition, in their egg-chambers for food for their larvæ when these emerge from the egg. A great number of observations have been made bearing on this subject, but much still remains to be learned. It is probable that the habits of the vast majority of species are yet practically unknown, except in a very general way. The following note may have interest, because it is believed nothing has been recorded concerning ant-catching by wasps.

Early in August, 1908, while marooned at Albuquerque, New Mexico, waiting for delayed mail, I noticed one day beside a concrete walk that bordered a vacant lot in that city a throng of large red ants which resembled *Pogonomyrmex occidentalis*. The bunch was seething with excitement, and stragglers were continually coming and going. As I watched I noticed a small quadrate-headed wasp drop from the upper air to the

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hard-trodden soil, alighting without previous reconnoitering. She stood perfectly motionless, not even dressing herself after the manner of her kind when idle. Presently an ant hurried by, busy about nothing, as usual, when instantly the wasp gave chase. The ant dodged and doubled as it fled, but the wasp overtook and seized it after a very brief and intensely active resistance, for a *Pogonomyrmex* is by no means a helpless infant in a skirmish. The wasp and its still riotous victim rose heavily into the air and ascended at a sharp angle of flight, until they were lost in the blue of the sky. During the next few minutes I saw the same performance repeated again and again, with variations, until dozens of the ants had disappeared heavenward with the predatory wasps.

So intent were the wasps on their work that they seemed not in the least disturbed by my presence, and I managed to secure a number of both wasps and ants by taking quick advantage of the struggle always incident to the moment of capture.

Occasionally an ant, when pursued, would dodge around a blade of grass or rush beneath some welcome shelter and elude its hunter, but this happened in only a few cases. So swift and certain were the motions of the wasps that even with a vantage of six inches or more an ant once followed was almost certainly doomed. The wasps never, so far as I observed, assisted themselves with their wings to gain speed, but played fair with their victims and ran them down. The struggle generally lasted a second or two on the ground, and, as I have said, appeared to be continued fiercely in the air, judging from the frenzied actions of the two as they rose aloft.

It was clearly useless to attempt to locate the nest of the wasps, and I contented myself with observing the manner of capture. Some day some one will be at the nest when the ants are brought in, and the rest of the story will then be available.

Mr. J. C. Crawford, of the National Museum, has kindly determined the predatory wasp as *Aphilanthops taurulus*, Ckll. Another species taken at the same time and under the same conditions is possibly an undescribed form of the same genus. The ants, the victims of the assault, have been identified by Dr. W. H. Wheeler as *Pogonomyrmex barbatus*, F. Smith, subsp. *rugosus*, Emery.

I learn that several wasps of a genus nearly allied to *Aphilanthops* are preserved in the National Museum with ants pinned with them. This would argue in favour of a habit similar to the one recorded above, but no notes accompany these specimens referred to.

MOSQUITO COMMENT.

BY HARRISON G. DYAR AND FREDERICK KNAB, WASHINGTON, D. C.

Dr. Ludlow addresses her remarks (CAN. ENT., XLI, 21, 1909) to the senior author of this note. In a joint article, like the one in question (CAN. ENT., XL, 312, 1908), the responsibility is jointly shared, and Dr. Ludlow should have addressed us both. Any other course is likely to lead to error and to the imputation of responsibility in the wrong quarter, as in the present instance.

We are glad to learn that Dr. Ludlow uses precautions to prevent, as far as may be, errors arising from the unfortunate manner in which her specimens are preserved. Whether the error in the locality given for *Anopheles perplexens* arose as suggested by us, or as Dr. Ludlow now thinks probable, is immaterial to the point at issue; the point gained is that Dr. Ludlow now admits the error, and we may with the more security omit the species in any consideration of the North American fauna.

We would earnestly suggest to Dr. Ludlow's consideration such a disposition of her types that they would be easily accessible to students, either at the Surgeon-General's office or at the National Museum.

We would point out that the new genus, *Calvertia*, is preoccupied by *Calvertius*, Sharp (Coleoptera), and *Calvertia*, Warren (Lepidoptera).

Speaking of preoccupied names, the Culicid genus *Carrollia*, Lutz, has a narrow escape from that fate. We note the existence of *Carolia*, Cantr. (Mollusca), and *Carollia*, Gray (Mammalia), which will certainly cause confusion, yet all must stand under the latest rules. We do not think that the rule should be held to apply to terminations of names which may be in masculine, feminine, neuter or barbarous form, as the distinguishing of these is an unnecessary tax on the memory, but it undoubtedly applies to differences of single letters in the body of the name. We are able to recognize the genus *Carrollia*, Lutz, as distinct from *Culex*, the type being *Carrollia iridescens*, Lutz, and to add to it a second species, *Melanoconion Urichii*, Coquillett (CAN. ENT., XXXVIII, 61, 1906), which will now stand as *Carrollia Urichii*, Coquillett.

The following new species has come to our notice:

Culex trachycampa, n. sp.—Proboscis black, moderately long and slender, hardly swollen at the tip. Palpi black-scaled. Mesonotum blackish, clothed with dark bronzy-brown scales; abdomen subcylindrical, depressed, truncate at tip, dark-scaled above with coppery lustre, beneath with distinct white basal segmental bands. Legs blackish with bronzy

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lustre, the femora pale beneath to near the tip. Wings rather broad, the outstanding scales of the veins linear and narrowly ovate, denser on the forks of the second and fourth veins. Claws simple in the female. Length about 2.5 mm.

In the male the palpi are slightly longer than the proboscis, the apical portion hairy, bronzy-black throughout. Wings narrower than in the female, without the longest and narrowest scales; the coloration similar.

One male and one female, Las Cascadas, Canal Zone, Panama. (A. Busck, collector.)

Type No. 12194, U. S. National Museum.

A new mosquito has also come to hand from Banff, Alberta, for which we propose the name:

Aedes Sansoni, n. sp.—Closely allied to *Aedes subcantans*, Felt, but larger and darker in colour, the scales of the wings entirely black, not intermixed brown and whitish on the costa, as they are in *A. subcantans*.

Five specimens, Banff, Alberta, Canada. Collected in the summer of 1908. (N. B. Sanson.)

Type No. 12195, U. S. National Museum.

BOOK NOTICES.

DARWINISM TO-DAY. By Professor Vernon L. Kellogg. Pp. XII. + 403. New York: Henry Holt & Co.

The fifty years which have elapsed since the publication of Darwin's "Origin of Species," have witnessed the ardent prosecution of biological research in many directions. A vast number of new facts have been collected, correlated and their interpretation attempted. In the light of this new knowledge the various aspects of the theory of evolution by natural selection have been critically examined, in a manner much more searching than was thought possible to Darwin's contemporaries. Yet at the present time we still have the greatest diversity of opinion. On the one hand are scientific critics, of no mean influence, maintaining that natural selection is now discredited as the only, or even the chief, agent in the organization of species, and at the other extreme are those who are still firm believers in its efficiency.

The literature of the subject is largely controversial, widely scattered, and much of it in German, and in presenting the gist of it in a form which enables the biological student or the general reader to form a sound estimate of the present status of Darwinism, Prof. Kellogg has performed a very valuable piece of work.

After a preliminary definition of Evolution and Darwinism, the author proceeds to consider in detail the various attacks which have been made upon the latter, for example, those based upon the insignificance of fluctuating variations; the uselessness, in the struggle for existence, of many specific characters; the necessity for coincident variation; secondary sexual characters; complete degeneration of parts; elimination of connecting forms, etc. This is followed by a statement of the arguments put forward by the Darwinians in defence of their position.

A summary is then given of the various theories of species formation which have been proposed as auxiliaries, or alternatives, to that of natural selection, e. g., panmixia, germinal selection, orthoplasy, Lamarckism, orthogenesis, heterogenesis, etc., and the final chapter under the title, "Darwinism's Present Standing," is devoted to a summing up of the situation.

The work is written in a very readable style, meets a decided need, and can be recommended to all interested in the problems of evolution.

J. W. EASTHAM, O. A. College, Guelph.

BRITISH FLIES. Vol. V. By G. H. Verrall, F. E. S. 814 pp. London, 1909. Gurney and Jackson.

The second published volume of Mr. Verrall's projected series is number 5 of the entire plan, and includes the following families: Stratiomyidæ, Acanthomeridæ, Leptidæ (including sub-families Xylophaginæ and Coenomyinæ), Tabanidæ, Nemestrinidæ, Cyrtidæ, Bombylidæ, Therevidæ, Scenopinidæ, Mydaidæ, Apioceridæ and Asilidæ.

The treatment is full, almost encyclopædic, bringing together a vast mass of information about the various species, including larval characters and habits, as well as those of the adult, as far as the former are known. Even the families not occurring in Great Britain are provided with tables of genera and figures.

The illustrations are exceptionally fine, being drawn for this work by Mr. J. E. Collin, F. E. S. They are scattered through the text in convenient places for references, and are of a quality to delight the entomological eye, unsurpassed by anything ever presented in this order of insects.

Mr. Verrall does not accept the genera of Meigen's 1800 paper, recently discussed in this journal; in one of his notes (p. 772) he says:—"The contention that Meigen's genera of 1800 should be revived and claim priority, is on a par with the discovery of certain Chicago historians that the annulment of one of the marriages of King Henry VIII. was

invalid, and that, consequently, King Edward VII. is not the King of England!"

Mr. Verrall is to be congratulated on the completion of the second volume of the magnificent series planned by him. Such work is not of merely local or even national value, but affects entomology throughout the world. It sets a higher standard for us all.

J. M. ALDRICH, Moscow, Ida.

SECRETION OF HYDROCYANIC ACID BY *LEPTODESMUS HAYDENIANUS*, WOOD.

A number of instances of secretions of free hydrocyanic acid in the Myriapods of the family *Polydesmidae* have been recorded, and it is quite probable that this power is possessed by all the members of the family. In 1882 Egeling* discovered that *Paradesmus gracilis*, Koch,† secreted besides benzaldehyde free hydrocyanic acid. Weber (Archiv. f. Mikr. Anat., V. 21, 1882) showed that this secretion was diffused only from certain segments, and that the repugnatory glands, which produce the secretion, open near the middle dorsal line. Haase (Sitzungs. b. d. Gesell. naturf. Freunde zum Berlin, Jahrgang, p. 97, 1889) again refers to this curious secretion. In 1890 W. M. Wheeler reported (Psyche, V. 5, p. 442) this secretion in *Polydesmus (Fontaria) virginiensis*, Drury, an abundant species in the middle western States. Early last February, in the foothills near Palo Alto, I collected from beneath stones and logs a number of specimens of *Leptodesmus (Polydesmus) Haydenianus*, Wood, a common and variable Myriapod in this vicinity, and ranging northward to Oregon. They were collected alive, and when the bottle in which they were contained was opened, the strong and pungent odour of prussic acid was almost overpowering. A chemist friend of mine applied the test, and the result showed free hydrocyanic acid. This test, as given by Wheeler, is quite simple: "A few of the *Polydesmi* were ground up in a mortar with a small quantity of water. A few drops of potassium hydrate and ferrous sulphate were then added to the solution obtained by filtering the mass. On the application of gentle heat, and the further addition of a little ferric chloride to dissolve the precipitated ferrous and ferric hydrates, the faint but distinct tinge of Prussian blue attested the presence of free hydrocyanic acid."—K. R. COOLIDGE, Palo Alto, Calif.

*Pflüger's Archiv. f. d. ges. Physiol., V. 28, 1882.

†Indigenous to the Fiji Islands, Moluccas, etc., but now acclimitized in European hothouses.

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No. 4.

THE JAMES FLETCHER MEMORIAL FUND.

THE OTTAWA FIELD-NATURALISTS' CLUB. OTTAWA, MARCH 8TH, 1909.

SIR,—You have no doubt heard with regret of the death of Dr. James Fletcher, Entomologist and Botanist of the Dominion Experimental Farms, which occurred after a short illness at Montreal, November 8th, 1908.

Dr. Fletcher not only did most excellent work for the country in his official capacity, but, as is well known, took a most active part in encouraging the study of Natural History in its broadest aspects throughout the Dominion.

His activities in this connection have been widely recognized and greatly appreciated by scores of students and others who have benefited by his timely assistance and warm encouragement. He was always in requisition as a lecturer by Normal Schools, Natural History and other Societies, for he had gained a wide popularity as a charming and exceedingly instructive speaker.

The Ottawa Field-Naturalists' Club, of which Dr. Fletcher was one of the founders, have thought that his life-work was of such a national character that a permanent tribute to his memory should be made. Such a memorial would not only serve to commemorate for all time the good work done by Dr. Fletcher, but would also act as a stimulus to future generations in the study of the fauna and flora in Canada.

Several suggestions have been made as to the form the memorial should take, namely:

- (a). A fountain at the Central Experimental Farm.
- (b). A statue to be placed in the grounds of the new Natural History Museum.
- (c). A bust or portrait to be placed in that building, or at the Central Experimental Farm.
- (d). To found a bursary at some Canadian University.

Of necessity no decision can be reached until it is known, approximately at least, what amount of money can be raised.

The Council has appointed the members hereafter named to be a Committee to ascertain what response might be forthcoming to an appeal for contributions towards such a memorial.

Will you kindly inform the Secretary the amount you are agreeable to subscribe to this fund and send it at your earliest convenience to the Secretary-Treasurer of the Committee.

Committee: A. E. Attwood, M.A., President, O. F. N. C.; T. E. Clarke, B.A., Secretary, O. F. N. C.; Arthur Gibson, Treasurer, O. F. N. C.; Hon. Sydney A. Fisher, B.A., Minister of Agriculture; W. Saunders, C.M.G., LL.D., F.L.S., F.R.S.C., Director of Dominion Experimental Farms; E. R. Cameron, M.A., K.C., Registrar, Supreme Court; R. B. Whyte, Vice-President of Ontario Horticultural Association; Frank T. Shutt, M.A., F.I.C., F.C.S., F.R.S.C., Chemist, Dominion Experimental Farms; A. McNeill, Chief of Fruit Division, Dept. of Agriculture; H. M. Ami, M.A., D.Sc., F.G.S., F.R.S.C., Assistant Paleontologist of the Geological Survey.

Signed on behalf of the Committee,

E. R. CAMERON, *Chairman.*

ARTHUR GIBSON, *Secretary-Treasurer.*

(*Central Experimental Farm.*)

NOTES ON TENTHREDINOIDEA, WITH DESCRIPTIONS OF NEW SPECIES.

BY S. A. ROHWER, BOULDER, COLO.*

Paper IV.

(New Species of *Tenthredo*.)

Tenthredo mellipes, n. sp.

Female: Length, 9 mm. Clypeus deeply, squarely notched; labrum rounded at the apex, fringed with long hairs; malar space distinct, but not very wide; frontal carinæ large at the base (*i. e.*, at the antennæ), larger than in *rufipes*, Say; frontal furrows distinct, reaching to the occiput; the furrow behind the ocelli indistinct. Third antennal joint longer than the fourth by about a third. Scutellum dull, rather densely punctured, the punctures coarser than those of the rest of the thorax. Tarsal claws with a tooth about a third of the length of the claw from the apex. The tran. rad. in about the middle of the third cubital cell. Abdomen more shining than the thorax. Colour black; labrum, apical

margin of the clypeus, palpi, and all the legs dull brownish-yellow; the tarsi somewhat infuscated. Wings smoky hyaline; nervures and stigma dark brown.

Habitat: Graymont, Colorado, July, 1892 (C. P. Gillete). Type in the collection of the Colorado Agricultural College.

This species was given the manuscript name of *mellipes* by W. H. Harrington, at whose request I describe it. It is closely related to *T. erythromera*, Prov., but separated by the characters given below. The waxen brownish-yellow of the legs should help to distinguish this species from its allies. The following table will aid in the separation of most of the species with black abdomens; most of the following have the legs largely ferruginous:

Tegulæ and collar black	1.
Tegulæ and collar pale	4.
1. Legs dull brownish-yellow, the coxæ of the same colour; no pale spot above the posterior coxæ	<i>mellipes</i> , Roh.
Legs rufous (the anterior tibiæ and tarsi in a few cases are yellowish)	2.
2. Coxæ rufous; a pale spot above posterior coxæ	<i>rufipes</i> , Say.
Coxæ black	3.
3. A pale spot above the posterior coxæ	<i>nigrisoma</i> , Harrg.
No pale spot above the posterior coxæ	<i>erythromera</i> , Prov.
4. Pectus pale	5.
Pectus black	6.
5. Legs with a black line above	<i>zetes</i> , Kby.
Legs without a black line above	<i>rufopectus</i> , Nort.
6. Tibiæ entirely rufous	7.
Tibiæ, or at least some of them, with a black line	8.
7. Coxæ black	<i>ruficollis</i> , Harrg.
Coxæ rufous	<i>rufipes</i> , Say, var.
8. Posterior tibiæ with a black line above	<i>Savagei</i> , MacG.
Posterior tibiæ entirely rufous	<i>nigrifascia</i> , MacG.

Tenthredo ferrugineipes, var. *Pikei*, n. var.

Female: Length, 11 mm. Similar to *ferrugineipes*, Cress., but differs as follows: The yellow on the cheeks replaced by rufous, tegulæ testaceous, not yellow; posterior femora; a black spot on the middle femora at

the base above ; abdomen with only the fourth segment rufous ; wings a trifle more yellowish.

Habitat : Pike's Peak, Colorado, alt. 10,000 ft., July 20, 1906 (L. Bruner). Type in the University of Nebraska.

This may prove to be a distinct species.

Tenthredo pallicolus, var. *Beulahensis*, n. var.

Female : Length, 10 mm. Differs from Dr. MacGillivray's description (Jn. N. Y. Ent. Soc., Sept., 1897, p. 160) of *pallicolus*, in having the inner orbits narrowly yellow, the base of the stigma only is luteous, and the venation is very pale brown. It is also smaller.

Habitat : Beulah, N. M., Aug. 3, 1902, "on foliage of *Veratrum*" (Cockerell).

Tenthredo relativus, n. sp.

Female : Length, 9.5 mm. Clypeus circularly emarginate, lobes broad ; third joint of the antennæ longer than the fourth, all the joints somewhat enlarged at the apex. Head and thorax shining, without the usual punctures ; postscutellum roughened ; metapleuræ strongly produced at the sides ; tarsal claws cleft, teeth equal ; venation normal ; sheath rather narrow, rounded at the apex, with a distinct fringe of hairs. Colour : head yellow ; a large spot from the antennæ to the occiput, spot on the superior orbits, and the antennæ, except the two basal joints beneath, black. Thorax black, much marked with yellow ; pronotum, except a transverse band, tegulæ, margin of the middle lobe of the mesonotum, scutellum, metanotum, a large part of the mesopleuræ, line from the middle coxæ to beneath the anterior wings, a spot above the posterior coxæ, and the basal plates, except a spot in the middle, *yellow*. Abdomen ferruginous, a band on the first three segments at the sides above, and a spot on each side of the fifth segment at the sides above, black. Anterior legs, middle and posterior coxæ except bases, middle and posterior trochanters *yellow* ; middle and posterior femora, tibiæ and tarsi *rufous*. Wings yellowish hyaline, iridescent ; nervures and apical third of the stigma dark brown ; costa and base of the stigma testaceous.

Habitat : West Point, Nebraska, June 21, 1905 (H. S. Smith). Type in the University of Nebraska.

This species is near *rubripes*, MacG., but differs at once in the black pectus. It differs from *perplexus*, MacG., in having the legs below the

trochanters rufous, the costa testaceous, and the sutures of the anterior lobe of the mesonotum are yellow. It differs from *verticalis*, Say, to which it is also related, in the different coloured legs, and is much more shining than that species, lacking the dense punctures of the dorsulum that are present on *verticalis*.

Tenthredo zelmirus, n. sp.

Male: Length, 10 mm. Clypeus deeply emarginate, the lobes triangular, broad, the apex rounded; labrum rounded at the apex; eyes strongly converging below; third antennal joint about a third longer than the fourth, all the joints somewhat enlarged at the apex; middle furrow of the anterior lobe of the mesonotum distinct; mesonotum and scutellum densely punctured; tarsal claws cleft, the teeth spreading and small; the inner spur of the anterior tibiæ bifid; venation normal, transverse radial curved. Colour black; clypeus, labrum, mandibles, except the piceus apices, palpi, sometimes a spot above the posterior coxæ, and a small spot on the pleuræ yellow; abdomen, except the basal and the two apical segments, coxæ, extreme bases (the anterior coxæ in one specimen are black), femora, except a black line above (this line on the posterior femora is widely broken in the middle), and the four anterior tibiæ and tarsi rufous. Wings dusky hyaline; nervures and stigma black, the costa sometimes a little paler, venation strong.

Habitat: Ute Creek, Costilla Co., Colo., alt. 9,000 ft., July, 1907 (L. Bruner and R. W. Dawson); Russel, Colo., June 25, 1907 (L. Bruner); and Ft. Garland, Colo., July 12, 1907 (L. Bruner). Type and paratypes in the University of Nebraska, and paratypes in my collection.

This species should be easily known by the rufous coxæ. It may be the male of *tricolor*, Nort., or it might be the male of *sectiliformis*, Roh. It differs from this last species in having the legs marked with black, and in being a little larger.

Tenthredo Utensis, n. sp.

Female: Length, 10 mm. Clypeus deeply emarginate, lobes triangular; labrum large, rounded at the apex; frontal carinæ not so strong as usual; third antennal joint about as long as four plus five, from the third the joints gradually decrease in length, the entire antennæ covered with short, fine hair; middle furrow of the middle lobe of the mesonotum almost wanting; mesonotum and scutellum with well-separated punctures; inner spur of the anterior tibiæ with the apex bifid; tarsal claws cleft, the

inner tooth the shorter ; tran. med. received basad of the middle of the cell ; tran. rad. in about the middle ; sheath rather long, the lower and upper margins parallel, the apex rounded, but more strongly so below ; cerci robust, short. Colour black ; clypeus, labrum, mandibles, except the piceous apices, palpi, lower part of the cheeks, posterior angles of the pronotum, tegulae, a broad line on the mesopleurae, a vertical line below the posterior wings, coxae, trochanters (there is a small spot on the posterior pair above), femora, except a spot at the apex above on the anterior pair, a line above on the posterior pair and the apical third, tibiae, except a line above (this line is sometimes interrupted), all the tarsi (the posterior pair are somewhat rufous) *yellow* ; a spot above the posterior coxae cream-colour ; base of the venter and the sides of the basal plates *reddish-yellow* ; the rest of the abdomen, except the three basal, tergal segments and the sheath, which are black, rufous. Wings clear hyaline, somewhat iridescent ; venation rather weak, the veins and stigma brown, becoming pale at the base of the wing ; the costa reddish-yellow.

Habitat : Ute Creek, Costilla Co., Colorado, alt. 9,000 ft., June 22, 1907 (R. W. Dawson). Type in the University of Nebraska.

This pretty species is quite distinct from all the other western species, coming nearest to *pallicolus Beulahensis*, but it is quite distinct from that species. It is perhaps closest to *Junghannsii*, MacG. (N. H.), but is smaller, the first three tergal segments are black, and all the tarsi are yellow.

A female from Hot Creek, Nebr., Aug., is not typical, but evidently the same.

Tenthredo varifrons, n. sp. .

Male : Length, 9.5 to 11 mm. Clypeus sub-semicircularly emarginate, lobes somewhat variable in width, but broad and obtuse ; frontal furrows distinct to occiput, the transverse furrow behind the lateral ocelli wanting or only faintly indicated ; frontal carinae not reaching to the anterior ocellus. Third antennal joint much longer than the fourth ; the apical joint and the preceding of almost equal length ; the apical joint obtuse at the apex. Furrow of the middle lobe of the mesonotum distinct ; lateral lobes closely punctured, opaque ; scutellum very closely punctured, almost granular ; postscutellum not distinctly carinated. Venation normal ; tarsal claws cleft, teeth about equal. Colour black ; clypeus, labrum, cheeks, a dot between the antennae sometimes, a spot above

each antenna, tegulæ, a spot on the posterior angles of the pronotum, spot on the propleuræ, a broad line on the mesopleuræ, mesopectus, spot above the posterior coxæ (sometimes two), sides of the basal plates, legs beneath from the coxæ to the tarsi except the hind tibiæ and tarsi (the middle tarsi are also sometimes black), *yellow*. Abdomen yellowish-ferruginous except the basal dorsal segments (sometimes the abdomen is almost entirely black). Wings dusky hyaline; venation dark brown.

Habitat.—Twenty-one males, Ute Creek, Costilla Co., Colorado, alt. about 9,000 ft., July, 1907 (H. S. Smith, L. Bruner and R. W. Dawson); 2 males, Sierra Blanca, Costilla Co., Colorado, alt., 10,000 to 11,500 ft., July (L. Bruner); 4 males, Florissant, Colorado, July, at flowers of *Heracleum lanatum* and on *Juncus*, sp. (S. A. Rohwer); one male from the top of Las Vegas Range, New Mexico, approx. 11,000 ft., June 28 (Cockerell).

This species is near *variegatus*, Norton, but distinguished at once by the longer apical antennal joint (the apical joint of *variegatus* is distinctly shorter than the preceding) and by the black tibiæ, as well as many other differences.

Tenthredo Titusi, n. sp.

Male: Length, 11.5 mm. Clypeus squarely emarginate; labrum rounded at the apex; antennal joints somewhat produced at the apex beneath, the third joint longer than the fourth; head shining, with a few fine widely-scattered punctures; meso- and metanotum closely punctured with well-defined punctures; postscutellum with a medial carina, which extends on the posterior part of the scutellum; tarsal claws deeply cleft; inner spur of the anterior tibiæ with a spur about one-third of its length from the apex; tran. rad. received near the tran. cub.; tran. med. received in the basal third of the cell. Colour black, yellow and rufous; head black, except the clypeus, labrum, mandibles (the apices piceous), lower half of the cheeks, palpi, a spot above each antenna, a spot between the antennæ, a spot on the upper inner orbits, which are *yellow*; thorax black above, except a spot behind the postscutellum and a transverse spot before the basal plates, which are *rufous*; posterior angles of the pronotum, lateral angles of the pronotum, tegulæ, mesepimera, except a transverse black band below the tegulæ, a vertical line below the posterior wings, spot above the posterior coxæ, sides of the basal plates, and a narrow apical margin of the same *yellow*; legs: four anterior coxæ, four anterior

trochanters, femora, tibiae and tarsi, except a black line above (the intermediate tibiae and tarsi are slightly rufous), posterior coxae and trochanters, except a black line above, *yellow*; posterior femora, except a black line above, all of the tibiae and tarsi, *rufous*; abdomen, except a narrow line on the margin of the posterior segment, *rufous*; venter at the base a little whitish. Wings subhyaline; nervures dark brown, costa and base of the stigma rufous.

Habitat.—Rist Canyon, Larimer Co., Colorado, July 3, 1897. "Taken sweeping rose bushes." Collected by E. G. Titus, for whom it is named. Type in the collection of the Colorado Agricultural College. A male from Ute Creek, Costilla Co., Colorado, alt., 9,000 ft., July 1, 1907 (R. W. Dawson), is a little smaller, and there is no black line on the anterior tibiae.

This species comes near *messica*, MacG., but differs in not having the yellow of the mesopleurae and the pectus confluent, and the entirely rufous posterior tibiae.

Tenthredo divergens, n. sp.

This species is very close to *Titusi*, but the clypeus is deeply, circularly emarginate, and the following differences were noted:

T. Titusi.

1. Very robust.
2. Third antennal joint a third longer than the fourth.
3. Mesocoxae almost all yellow.
4. Posterior tibiae without a black line above.
5. Claws deeply cleft.
6. Postscutellum with a carina.
7. Tran. med. not so near the basal.

T. divergens.

1. Not so robust.
2. Third antennal joint but a fourth longer than the fourth.
3. Mesocoxae almost all black.
4. Posterior tibiae with a black line above.
5. Claws not so deeply cleft.
6. Postscutellum without a carina.
7. Tran. med. about a fifth of the length of the cell from the v basal nervure.

Habitat.—Florissant, Colorado, July 7 and 13, 1907, on foliage of *Salix brachycarpa* (S. A. Rohwer).

The Fyles Collection of Province of Quebec Lepidoptera has been purchased by the Quebec Government, for the Provincial Museum in the Parliament Building at Quebec. The Provencher Collection of Hymenoptera is in the same museum.

NOTES ON *CECANTHUS*.

BY C. O. HOUGHTON, DELAWARE EXPERIMENT STATION, NEWARK, DEL.

In Entomological News for February, 1904, the writer published some notes* concerning the oviposition of *Cecanthus niveus*, De Geer, and the habits of the nymphs and adults of this species in confinement. As the title of the article would indicate, it was thought at the time that the method of oviposition there recorded (the eggs being laid singly in apple and plum trees) was an unusual one, as all of the earlier writers credited the snowy tree-cricket (*O. niveus*) with the injury to pithy plants caused by the deposition of eggs in long rows. It seemed strange, however, that this species should have two methods of oviposition differing so widely as this would indicate, and the writer determined to rear some tree-crickets from eggs laid in long rows, as soon as an opportunity presented itself. This did not occur, however, until the past season.

Observations by Prof. P. J. Parrott and Mr. J. P. Jensen in New York State, and by the writer in Delaware, during the past season (1908) have shown that the earlier writers were evidently in error regarding the identity of the species injuring raspberry and blackberry canes, and other pithy plants (and also some fruit trees), by depositing its eggs in long rows. The species largely, if not entirely responsible for such injury, in this region at least, is undoubtedly Walker's *nigricornis* and its varieties.

So far as I am aware, all recent data on the subject tend to show that the method of depositing eggs singly, as discussed by me in my article in 1904, is the usual one in the case of the snowy tree-cricket, *O. niveus*.

On April 12, 1908, I collected near Newark, Del., a few pieces of branches of the common elder, *Sambucus canadensis*, L., which contained eggs, deposited in long rows, of a species of *Cecanthus*. Some of the rows of egg scars were evidently a year or more old, as they contained no eggs, but there were three or four that contained numerous living eggs. These sections of branches were brought to my laboratory and placed together in a glass cylinder. Frequent examinations of the cage were made, but no young crickets were found until May 16th. Several appeared on that date, and they continued to emerge until the 20th. In all, about 50 were secured and bottled singly or in pairs in shell vials. Several others got away. I fed the nymphs on various kinds of plant-lice, principally, until

*An Unusual Injury by the Snowy Tree-cricket and Notes on Its Feeding Habits. Vol. XV, pp. 57-61.

See also pp. 150-152 of the 15th Ann. Report of the Del. College Agric. Experiment Station.

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July 16th, when one of them, a male, reached maturity. At this time I had but one other living nymph, all the others having died, or having been killed by their mates or by ants in the vials with them, previous to the middle of July. This remaining nymph, a female, reached maturity on Aug. 6th, and died Sept. 5th, having lived on a diet of flies for a period of about seven weeks.

On June 30, 1908, I forwarded to Dr. L. O. Howard, Washington, D. C., a few of the nymphs which had died in confinement, and these were determined by Mr. A. N. Caudell as *O. quadripunctatus*, Beutenm. On Sept. 16, I forwarded to Dr. Howard the specimens that had reached maturity, with the request that these be placed in the collections at Washington. In reply, I received a letter from Mr. C. L. Marlatt, Acting Chief of the Bureau of Entomology, in which he stated that the specimens had been referred to Mr. Caudell, who submitted the following report :

"For some time I have had *Æcanthus quadripunctatus*, Beutenm., marked in the collection as a variety of *nigricornis*, Walker, and this rearing by Mr. Houghton proves that it is so. The nymphs sent some time ago, in the early part of July, showed the basal two segments of the antennæ each with two spots, as is characteristic of *quadripunctatus*. The adults now received, which are from the same deposition of eggs, are typically *nigricornis*. Thus the name *quadripunctatus* falls as a specific name, though I shall continue its use to indicate the adult forms in which the antennal markings remain separate."

Of course, it is possible, though hardly probable, that the eggs which I collected on April 12th were laid by two different species ; and some of my nymphs doubtless came from each of the three or four rows of eggs that I had under observation. My own opinion in the matter, however, is that Beutenmuller's *quadripunctatus* is simply a variety of Walker's *nigricornis*, as the above breeding experiments would seem to indicate. Additional data to support this theory are to be found in the fact that later in the season (Sept. and Oct., 1908) I found the typical *nigricornis* and its variety *argentinus* intimately associated with *quadripunctatus* in depositing eggs in long rows in young peach trees at Newark, Del., and in captivity a ♂ *quadripunctatus* mated with a ♀ *argentinus*.

In confinement the species under observation the past season acted much as did the nymphs of *niveus*, already reported upon. They fed freely upon various kinds of plant-lice and flies, and occasionally developed cannibalistic tendencies, the larger eating the smaller when two individuals were enclosed in one shell vial. In one instance a nymph

was found feeding upon a portion of a dead cricket in the vial with it, although the bottle contained a good supply of living aphids at the time.

On June 23, I collected some leaves of *Viburnum acerifolium*, L., upon which were numerous plant-lice and a few of their attendant ants. As it was rather difficult to remove all the ants without dislodging many of the aphids, I allowed three of the ants on one leaf to go into a shell vial with a tree-cricket, and a single ant to go into another vial with another cricket. The following morning both of the crickets were found considerably mutilated by the ants, one of them being dead and the other nearly so. After this experience I did not allow any ants to go into the vials along with the aphids.

Apparently but very little vegetable matter was eaten by the nymphs while in confinement, and I did not observe the adults feeding upon vegetation at any time. I once saw a nymph begin feeding upon some peach leaves, on sprouts bearing numerous aphids, before she began to eat the latter, but the larger part of her meal consisted of the plant-lice. Again, some radish leaves, with numerous aphids upon them, were slightly eaten by the young crickets in one instance. It is evident, however, from my observations upon the genus *Æcanthus*, that our tree-crickets feed almost entirely upon animal matter.

NEW HISTORIES IN PAPAIPEMA (HYDRÆCIA).

BY HENRY BIRD, RYE, N. Y.

(Continued from Vol. XLI, page 68).

Few of our Noctuid moths constituting the genus *Papaipema*, Sm., have been so well known autotopically as the species *rigida*, described by Grote in 1877 under the generic term *Gortyna*. In 1882 he published a very good figure of the moth,* and from that date, at any rate, identification has been easy. As it belongs to a group that fly readily to light, its captures here and there were duly noted, though always as a rare insect. At the time of the publication of the "Revision of Hydroecia," by Prof. J. B. Smith, in 1899, its range was given as the New England and northern Middle States, westward to the Mississippi, but it was recorded as "by no means common."

The writer's efforts to discover the larval habits in the group naturally brought this species early to mind, but it had never occurred in the Rye locality as a moth, and the years went by without encountering its larva.

*Papilio, II, p. 64, Plate I, fig. 3, 3a.
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So attention was directed to other places, that have now produced the information desired. By far the most enticing was the New Brighton locality of western Pennsylvania, where the light traps of Mr. F. A. Merrick yearly secured a few of the moths. Conditions of these captures were such as to prove that the larvæ must be at work in the immediate vicinity of the traps, yet dig and delve as we may, search and eliminate, try and guess again, for three successive years at a proper date, we were unable to get the faintest clue to the food-plant. As if to give us the laugh, the traps each year kept taking an increasing number of the moths, and jovial Mr. Merrick, newer at the business and less callous to failure, concluded we were stirring them up at any rate. At the close of the third season, when the larval history of *rigida* began to look like an interesting problem, light dawned from an unexpected quarter, and it was learned that the insect had been reared by Mr. F. E. Moeser, of Buffalo, N. Y. A specimen was forwarded to make sure that the larva he had discovered was really Grote's species, and in the following summer, 1908, as a guest of Messrs. Moeser and Lucas, the writer was introduced to the limited locality wherein the species had occurred the year before.

The food-plant was pointed out, and the author was considerably allowed to locate and uncover unaided his first specimen of *rigida* larva, which was an easy matter. Of course it is in a root, as was long suspected, and when *Helianthus decapetalus* was shown to be the answer to the riddle, it was recalled that these plants had been duly examined at New Brighton, but the fates had not kindly directed us to infested examples.

At the middle of July there is little intimation of a larval presence, the plants seem to be doing nicely and are beginning to bloom, and it is only by close inspection at the root that the telltale frass and a minute hole in the stem at the ground level are to be discerned. Being a plant of the open, there are usually grasses or small weeds about the roots, completely hiding this evidence, while any wilting or other detective clues are wholly wanting. So the more credit to its discoverer, since only one *Papaipema* bent would ever be likely to find the species, and it is not strange that thirty years have elapsed without this larva being recorded.

That *Helianthus decapetalus* is a preferred or primitive food-plant, there can be little doubt, from the evidence at Buffalo, and what is known of the plant. This is a question to be determined, though the range of a food-plant does not necessarily restrict the faunal zone of a moth. A good example occurs with *P. impecuniosa*, Grt., which changes from *Aster* to *Helenium autumnale* west of the Alleghanies, and flies over a very wide

range. Still, one following the early histories of this genus must be struck by their persistence in selecting a certain food-plant, and it is like going by a well-blazed trail if the list be but known.

Rigida matures at a mean date for the genus, about Sept. 15th, and emerges, from the hibernated egg unquestionably, about the first of June. The earlier stages were not observed, but where a larva passes its existence in a limited gallery, something can be gleaned of the early procedure. The newly-emerged larva bores to the centre of the stem, slightly above the crown, turns downward with the gallery, preserving and keeping free the original opening. It must reach the root early, else there would be a considerable enlargement at the crown, and this has not been noticed. In well-established plants a firm and entangled cluster of fleshy rootlets support three or four larvæ without serious detriment to their growth. There being no principal taproot, the tangle is pierced to some extent without regard for boring an individual section. This is especially true at maturity. The larva leaves the root-clump to pupate, the boring not offering advantages for the moth's escape. Of parasites, the limited observations only disclosed the presence of the species of *Hemiteles*, which is such a common check in this genus. Observations of the larva were sufficient to determine the most important question, its position compared with its allies, placing it in the section with *inquasita* and others, wherein the stripes are eliminated centrally, the effect of some former habit at an earlier epoch.

Penultimate stage of larva: Head normal, smooth and shining, yellowish-brown; the labrum, mandibles and ocelli touched with dark brown. There is no side line nor shade connecting the ocelli with the darkened edge of the shield; setæ normal; width 22 mm. Body cylindrical, less attenuated than some, colour dull pinkish, brighter doubtless in preceding stages. The dorsal and subdorsal lines rather broad, yellowish-white, all break abruptly at, and do not cross, the first four abdominal segments, where the even body-colour prevails. On the remaining abdominal joints, in addition to the whitish lines, the larva becomes white ventrally. On the meso- and metathorax the skin shows the usual creased or puckered appearance, which becomes filled out at the final stage. Cervical shield wide as head, of the same polished, corneous nature, though a little lighter in colour, its lower, lateral border edged with dark brown; the usual complement of setæ. Tubercles rather small for the stage, not very contrasting, mostly pale brown in colour; i and ii are minute, iv and v best shown, iv is largest, the size of the spiracle. On

joint ten this number is low, and has no accessory at the upper corner of the spiracle. Anal shield and preceding plates light in colour and of less prominence than in some cases. Spiracles elliptically ringed with black. Length, 27-30 mm., termination of stage July 20th to 25th.

Last stage: Head darker and less polished, no side line evident; width, 2.5 mm. Body gains in fullness more than length, colour yellowish-white, the lines lost. Tubercles and plates the same, the former more accentuated as their colour has darkened. Cervical shield preserves its prominence, the darkened lower edges merge together over the anterior portion. Lateral tubercles nearly of one size, iv low on joint 10; all are black. Spiracles now black. Length, 32-34 mm. Maturity is reached Aug. 1st to 6th. Pupa is rather slender, of the normal light chestnut-brown colour, the spiracles slightly darker, spur bifidate. There are no modifications of importance. Dates for emergence, Sept. 12th to 20th.

Superficially, *rigida* larva seems most like *sciata*, and when first encountered was welcomed as differing from the prevalent *nitela* class, where specific limitations are meagre. Frequently one finds in its company, in the same root cluster, the little *Sesia rutilans*, Hy. Edw., which seems fond of the *Helianthus* generally. Indeed, it must be a very general feeder, from its wide distribution and the number of food-plants already known, and it seems to have an unusual distinction in another direction. If Beutenmuller has the synonymy correct, a description under eight different names in one paper, with a place in two genera, is no mean record for such a little fellow.

TWO SUBMERGED SPECIES OF GEOMETRIDÆ.

BY RICHARD F. PEARSALL, BROOKLYN, N. Y.

It is rather curious that the application of our geometrid names should have become so confused. The two instances which, at this time, I seek to correct, concern species comparatively well known. Turning to our List (Dyar, No. 3383), we find *Mesoleuca hersiliata*, Guen., with synonym *flammiifera*, Walker. This is correct, so far as it goes, but after completing his description referable to *hersiliata*, Walker added the following: "Var. B.—Fore wings with the exterior emitting a much shorter tooth toward the discal mark; exterior band quite obsolete hindward, apical black mark much larger, marginal black line divided into pairs of points." In this brief reference he characterizes a species which has never been separated from *hersiliata*. It is entirely distinct in pattern of markings, and is larger in size, though its colour scheme is much the same. A detailed description follows under the name of

Mesoleuca Walkerata, n. sp.—Expanse, 28–30 mm. Best described by comparison with the familiar *hersiliata*. On fore wings the basal line turns outward below costa, forming a long sharp point below subcostal vein, and another above vein 1 in general course receding toward base. In *hersiliata* this line curves outward at costa, then runs in straight line to inner margin. Basal space gray, succeeded by an orange-brown band, rather narrow at costa, the discal line which forms the outer limit irregularly toothed across wing until it reaches vein 1, which it follows outwardly to about the width of band, then at right angle drops to inner margin. This band above vein 1 is sometimes entirely obscured by gray atoms, leaving only the square block below vein 1, in orange-brown or yellow. This line in *hersiliata* runs nearly parallel with basal line, or with an outward trend near inner margin, but not at all as in *Walkerata*. A band of dark gray, bordering discal line outwardly, follows its sinuities and above inner margin, also abruptly turns outward at vein 1, forming between that and inner margin a square block of dark gray scales. A similar band runs from costa to angle, within extra-discal line, from which to inner margin it fades out into the paler area of gray, traversed by one or two wavy lines, which occupies the central discal space. Discal dots small, linear, black. The extra-discal line starts from costa nearer the apex than in *hersiliata*, its outline much the same, except that the tooth-like projections are angulate, not rounded, and the notch opposite discal point is barely traceable in ♂ type, while in the ♀ it is quite apparent. This notch is not always a deep indenture in *hersiliata*, but is generally so. Colouring and lines of marginal space as in *hersiliata*. Hind wings evenly dusky, with faint extra-discal, but rather more angulate, and beneath all parts as in *hersiliata*.

Type, ♂ taken in Catskill Mts., July 2, 1905; type, ♀, July 1, 1899; co-type, one ♂ from same locality in the writer's collection. These are all I have secured in many years' collecting, so that the species is a rare one. In the Brooklyn Inst. Museum are specimens taken in the White Mountains of New Hampshire many years ago.

The second species is referred to by Dr. Packard (Mono., page 438), where in describing *Cymatophora (Cleora) larvaria*, Guen., he says: "This common species is divided into two races, one smaller and darker, with the antennæ more broadly pectinated, while the outer line in the hind wing is less angulated," etc. They are not races of the same species, as their structure and markings amply demonstrate, though they fly at the same season. I take both in moderate quantity each year in the Catskill Mts. I have named it

Cleora takenaria, n. sp.—Expanse, 25 mm. Palpi moderately stout, dark brown, tipped with white. Front, thorax and abdomen pale whitish-ash,

sprinkled with brown atoms; a band of these crosses front beneath antennæ, and across thorax in front. Each segment of abdomen narrowly edged with pale buff posteriorly, with a dorsal black spot anterior to it, largest on terminal segment. Second segment slightly darker. All wings broad, rounded, edges waved. Colour pale bluish-ashen, nearly white on discal space and beyond extra-discal line. Cross lines narrow jet black, heaviest on fore wings at costa. Basal line on fore wings one-fourth out, curves sharply outward below costa, then recedes toward base, as it crosses wing. Intra-discal when present encloses but does not obscure the large, elongate-oval discal ringlet, below which it can be traced faintly to inner margin, parallel with basal line. Extra-discal about two-thirds out, runs outward from costa, making a sharp angle at vein 5, reaching in one broad outward scallop the inner margin at about its middle. A pale olive-brown broad shade line runs outside the extra-discal and within the basal lines, sometimes clouding the entire basal area. A well defined serrate white line divides subterminal space centrally, outside which the wing is slightly darker. Two of its teeth at costa and opposite angle of extra-discal are filled in with jet-black scales. Fine marginal line black, with dots inside it, between veins. Fringes dusky. Hind wings with basal line heavy, black, running straight across wing, sometimes double part of length. Extra-discal angulate opposite cell, recedes toward base, passing beneath and touching the elongate oval discal ringlet, thence wavy to inner margin, parallel with the basal line. Otherwise as in fore wing, the three costal serrations of white line bordered internally with black. Beneath evenly dark gray, heaviest on fore wings. These have a broad black or dusky shade line, from costa just before apex, running parallel to margin, but narrowing and fading out before reaching internal angle. Basal and extra-discal lines faintly shadowed. Discals on all wings large, linear jet black. Abdomen beneath and legs white, the latter powdered with brown scales.

Type, ♂ taken in Catskill Mts., July 24, 1908; type, ♀ from same locality, August 4, 1908, and co-types in author's collection. Readily separated from its congeners by the large linear discal spots beneath, and from *larvaria* by the course of basal and extra-discal lines on hind wings at inner margin. In that species they both curve strongly downward. I suspect this may be Walker's *larvaria* (List Lep. Br. Mus., xxi, 344, 1860), since he mentions the large discal spots beneath, but his name falls, having been preoccupied by Guenée. It may, however, explain the association of these two species under that name.

ALLEGATIONS: NEW AND OLD.

BY W. L. DISTANT, LONDON, ENG.

In the CANADIAN ENTOMOLOGIST (ante p. 31), Kirkaldy writes: "*Budæus*, Distant, was founded on nymphs (mistaken for short-winged adults!)." In my description of the genus (Faun. Brit. Ind. Rhynch., 11, p. 76) I stated: "This genus is founded on six apparently undeveloped specimens." Comment is needless.

ORIENTAL CULICIDÆ.

In the October number of last year, page 376, is a criticism by Dr. H. G. Dyar of my recent CATALOGUE OF ORIENTAL CULICIDÆ, in which he refers to a printed slip containing additions and corrections, and which, as I therein noted, was to be regarded as M.S. corrections only, and not as a published supplement.

In fact, I intended to make the, at first, few corrections, actually in my own handwriting, but the publication of Mr. Theobald's fourth volume of his Monograph necessitated so many alterations and additions that it became impractical to adopt this plan, and I therefore had them printed, intending my correspondents to *enter them themselves in manuscript and then destroy the printed slip*, exactly as I should, in receiving a new book, turn first to the page of "*errata*" and make the necessary emendations in accordance with it. Thus they would have fulfilled the request I particularly made at the heading of the slip, to regard them literally as M.S. corrections by me.

As the printing of a few notes, lists or catalogues (under the express stipulation that they are issued in printed form merely to save the labour of copying) does not constitute publication, these notes are most certainly *not* "published." I, only, possess them; they are not on sale nor obtainable elsewhere; they bear no date, and, I repeat, were issued expressly as personal corrections only. Unless they are received in this manner I shall discontinue adding them to the separate copies of my Catalogue.

As regards the criticism of my work, I have nothing to say, except that my "new classification," as Dr. Dyar calls it, was not intended at all as a fresh view on this subject.

It was necessary to adopt some groups higher than genera, and therefore, to the *Culicinae* and *Corethrinae* subfamilies, which the authors of the recent Palæarctic Catalogue deem sufficient, I added the *Anophelinae* and *Aedeomyinae*, mainly as a concession to the views of workers in this family.

I certainly cannot regard all the subfamilies admitted by Theobald in the "Genera Insectorum" as of subfamily rank. The *Culicidae* suffer, in my thinking, from the usual tendency prevailing amongst specialists who limit their studies to a single family, and often have a very slight knowledge of the rest of the animal kingdom. This is to very much overrate the comparative value of the various distinctive characters.

Thus two or three allied genera get split off into a subfamily, whilst genera, subgenera and species are created *ad infinitum*, on the slenderest and often inconstant characters. In support of the expressed opinion in my Catalogue, that many of the new species could not hold specific rank, may be noted a tendency now to speak of "*Culex* so-and-so and its allies," which is a very convenient way of intimating the vagueness of the specific limitations.—E. BRUNETTI, Calcutta, India, January, 1909.

P.S.—Perhaps it may not be out of place here to incidentally record my complete agreement with Prof. Aldrich's views as to the inadvisability of overturning so many of Meigen's later (1803) generic names for those first (1800) adopted by him and subsequently discarded, and I regret much to see one or two of our leading European Dipterologists accepting the changed nomenclature.

THREE NEW SPECIES OF THE GENUS *BDELLA* (MIFES).

BY H. E. EWING, URBANA, ILL.

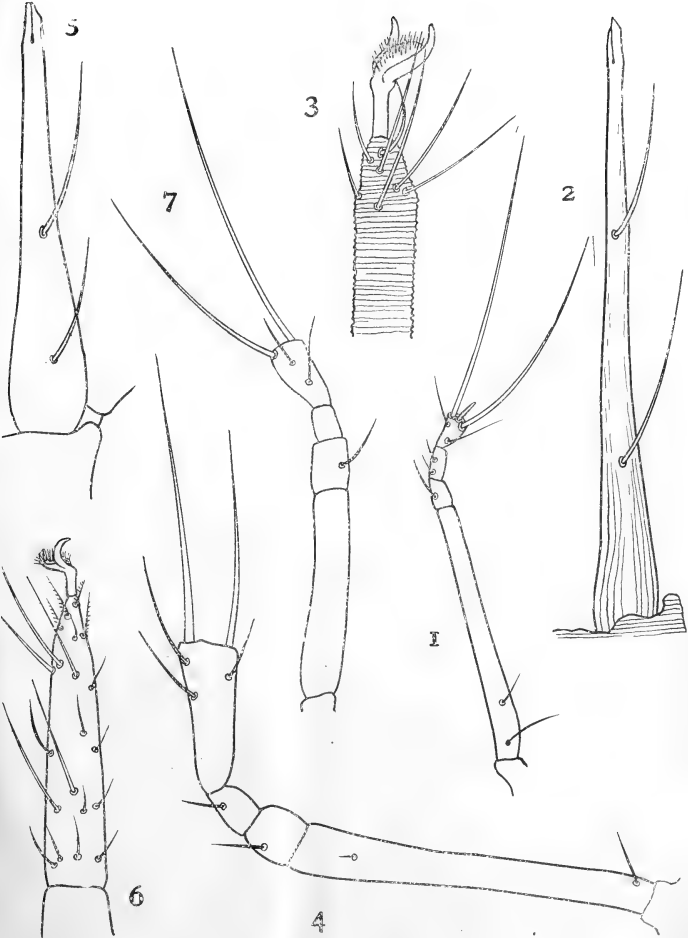
The genus *Bdella* is by far the richest in species of any of the genera of the family BDELLIDÆ, the members of which are especially characterized by their large beak, and frequently have their palpi geniculate. The members of this family of mites are predaceous, using their powerful chelate mandibles for attacking their prey. Up to the present time only ten species of this genus have been recorded from the United States, this paper bringing the number up to thirteen known to our country.

KEY TO SPECIES DESCRIBED.

1. Segment 3 and 4 of palpus subequal. *B. corticis*.
 Segment 3 much stouter than 4. 2.
2. Distal segment of palpus over twice as long as segment 4. . . *B. muscorum*.
 Distal segment of palpus scarcely one and one-half times as long as
 segment 4 *B. depressa*.

Bdella corticis, n. sp. (Plate vi, figs. 1, 2, 3).—Colour yellowish-green, with blotches of black.

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NEW SPECIES OF BDELLA (MITES).

Cephalothorax as broad as long ; beak three-fourths as long as leg 1 ; each mandible bears dorsally two rather prominent bristles, a large bristle situated at about one-third the distance from the anterior to the posterior end of the mandible, and a similar bristle at about an equal distance from the base of the same. Palpi surpassing the mandibles ; second segment almost equal to the mandibles in length ; third and fourth segments subequal in length, but the third slightly stouter than the fourth ; distal segment equal to the fourth in length, but about twice as broad at the distal end as at the proximal end. Second segment with three or four moderate bristles ; third with a single bristle ; fourth with two subequal bristles on the outer margin, each about as long as the width of the segment itself ; distal segment with six bristles, two very large tactile ones at the end of the segment, the outer about as long as the palpus itself, the inner about three-fourths as long ; between the two large tactile bristles are situated two small bristles, the outer about as long as the segment itself, the inner about two-thirds as long ; one situated laterally, about as long as the segment itself, one situated dorsally near the base. A single pair of eyes is present at the postero-lateral border of cephalothorax.

Abdomen about three-fifths as broad as long, broadest at the anterior end ; two rather prominent, straight, posterior bristles situated on the posterior margin near the median plane ; a pair of small shoulder bristles also present.

Legs large ; posterior pair longest ; anterior pair about one and one-half times as long as the beak, and each succeeding pair slightly longer than the pair preceding it. Claws and caroncle of legs small. Tarsus of leg 1 longer than tibia.

Length, 0.70 mm.; breadth, 0.52 mm.

Under bark of cottonwood. Collected by the writer at Urbana, Ill.

Bdella muscorum, n. sp. (Platevi, figs 4, 5, 6).—Red, body somewhat darker than the legs and palpi.

Cephalothorax large, lateral margins convex. Beak about as long as the cephalothorax. Mandibles each with a prominent curved bristle near the middle of the dorsal surface, and a smaller bristle near the base. Palpi slightly surpassing the beak ; second segment fully two-thirds as long as the mandibles ; third segment shorter but stouter than the fourth ; distal segment about one-half as long as segment two, but stouter, being enlarged at its distal end. Segment two of palpus bearing a short bristle on its

inner margin near the base, and three or four short bristles on its outer margin; segment four with a superior and a lateral bristle; distal segment with two very large terminal bristles, the outer of which is the longest, being equal to the total length of the palpus, the inner being about three-fourths as long, three other bristles on the distal segment, two on the outer margin near the distal end, and one near the inner margin about one-third the distance from the distal to the proximal end. Two pairs of eyes present, situated close together at the postero-lateral aspect of the cephalothorax.

Abdomen about one-half as broad as long, with a pair of small shoulder bristles and two pairs of subequal posterior marginal bristles.

Anterior pair of legs about one and one-half times as long as the beak. The two posterior pairs of legs are longer than the two anterior pairs of legs. Tarsus of leg 1 one and one-half times as long as the tibia; claws and caroncle of tarsus stout.

Length, 0.85 mm.; breadth, 0.60 mm.

In moss. Collected by the writer at Muncie, Ill.

Bdella depressa, n.sp. (Plate vi, fig. 7).--Cephalothorax, not including the beak, about one-half as long as the abdomen; beak two-thirds as long as the abdomen. Palpi surpassing the beak; segment two almost as long as the beak; segment three twice as long and almost twice as thick as segment four; distal segment equal to segment three in length, but only as broad as segment three at its distal end, which is much broader than the proximal end. Distal tactile bristles of the end segment almost equal, being about as long as the total length of the palpus. A double pair of eyes present; situated at the postero-lateral aspect of the dorsal surface of cephalothorax about their width from the cephalothoracic abdominal suture.

Abdomen twice as long as high; very sparsely clothed with simple, stiff, short bristles, which are slightly longer towards the posterior margin.

Anterior pair of legs as long as abdomen; tarsus of leg 1 longer than the tibia; claws and caroncle stout, situated on a pedicel as long as the thickness of the tarsus. Legs clothed with simple bristles, which are longer towards the distal end of the leg.

Length, 0.70 mm.; breadth, 0.50 mm.

Under bark. Collected by the writer at Arcola, Ill.

EXPLANATION OF PLATE 6.

Fig. 1.—*Bdella corticis*, n. sp., left palpus, x 108.

“ 2.— “ “ right mandible from above, x 240.

Fig. 3.—*Bdella corticis*, tip of tarsus of leg 1 with ambulacre; from the inside and below, x 500.

Fig. 4.—*Bdella muscorum*, n. sp., left palpus, x 160.

“ 5.— “ “ right mandible, x 140.

“ 6.— “ “ tarsus of leg 1, x 160.

“ 7.—*Bdella depressa*, n. sp., right palpus, x 240.

NOTES ON SOME HEMIPTERA TAKEN IN THE BERMUDAS
BY W. J. PALMER.

BY E. P. VAN DUZEE, BUFFALO, N. Y.

I am indebted to Mr. W. J. Palmer, of Buffalo, N. Y., for a small but very interesting collection of Hemiptera taken by him on the Bermuda Islands on December 9th, 1908. He was on the islands but two or three days, and had very little time for scientific work, but he was able to secure 120 specimens representing seventeen species. A very good showing, considering the season and the limited fauna of these islands. Prof. Verrill, in his “Bermuda Islands,” published in 1903, lists all the species known to him to have been recorded as taken in these islands up to that time. Excluding the plant lice, he enumerates 20 species, to which must be added one, *Tinobregmus vittatus*, Van Duzee, recorded by Prof. Herbert Osborn, but overlooked by Prof. Verrill, and possibly the *Cicada* recorded by Dr. Uhler as *tibicen*, but perhaps considered identical with *Bermudiana* by Prof. Verrill. To these must now be added twelve of the species recorded below as taken by Mr. Palmer, making a total of thirty-four species now known from these islands. The identity of a few of those quoted by Prof. Verrill is doubtful. The *Lygus* he figures at plate 99, fig. 17, may be *Lygus apicalis*, var. *prasinus*, Reut. The *Rhapigaster cydnus* recorded by J. M. Jones is unknown to me, and may represent merely a clerical error. The *Nabis* reported by Dr. Dahl may very likely be the *Reduviolus capsiformis* taken by Mr. Palmer. These identifications may reduce the total number of recorded forms to 30 or 31.

It is a somewhat remarkable fact that all the species taken by Mr. Palmer, and most of those recorded by Prof. Verrill, have also been taken in Florida. If this holds true for all the insect fauna of these islands, as it is very likely to do, we must look for the origin of this fauna to the

"drift" brought from the coast of Florida by the ocean currents. Of the thirty or more species now known from these islands, six are widely distributed forms common to Europe and America. These six are: *Nezara viridula*, Linn.; *Corizus hyalinus*, Fabr.; *Reduviolus capsiformis*, Germ.; *Cimex lectularius*, Linn.; *Lygus apicalis*, var. *prasinus*, Reut.; *Lygus pratensis*, Linn.; and *Trigonotylus ruficornis*, Fall. Five others, *Mormidea lugens*, Fabr.; *Jassus olitorius*, Say; *Ormenis pruinosa*, Say; *Liburnia ornata*, Stal, and *Agallia sanguinolenta*, Prov., have an extended range on the mainland of North America, where they occur as far north as Canada. Eight species: *Nezara viridula*, Linn.; *Corizus hyalinus*, Fabr.; *Pamera bilobata*, Say; *Reduviolus capsiformis*, Germ.; *Lygus apicalis*, var. *prasinus*, Reut.; *Lygus olivaceus*, Reut.; *Liburnia albolineosa*, Fowl., and *Athysanus exitiosus*, Uhler, are known to me to inhabit the West India Islands. *Cicada Bermudiana*, Verrill, if it prove to be a valid species, is the only precinctive form known from these islands. The following are the species taken by Mr. Palmer:

Nezara sp. Two nymphs. These are quite distinct from any nymphs of either *viridula* or *marginata* which I have seen, but they may represent some stage of one of those species. They most closely resemble the adults of *Nezara bipunctata*, Stal, from Brazil, but it seems unlikely that they could be of that species.

Corizus (Liorhyssus) hyalinus, Fabr. Two dark-coloured examples.

Pamera bilobata, Say. Three specimens.

Reduviolus capsiformis, Germ. Two examples.

Lygus pratensis, Linn. Common.

Lygus apicalis, var. *prasinus*, Reut. Four examples. Dr. Reuter reports the variety *inops*, Horvarth described from Spain to be identical with this American form.

Lygus olivaceus, Reuter. This was described by Dr. Reuter from material taken by me in Jamaica, and I have lately taken it in southern Florida.

Lygus sp. A strongly-marked species doubtfully identical with a species taken in Florida.

Amphiscepa pumila, Van D. Mr. Palmer reports this as very abundant on a low bush with thick succulent leaves, probably the "yellow daisy bush," *Borrchia arborescens*. I took it on what was probably the same plant in Florida, in which State the type specimens were taken by Mrs. Slosson.

Liburnia albolineosa, Fowler. Twelve specimens, all of which are paler than those from Florida, the West Indies and Mexico, but apparently not distinct.

Liburnia circumcincta, Van Duzee, M.S. Three examples. This species is described in a report on Florida Hemiptera, now in press.

Liburnia ornata, Stal. One brachypterous female.

Agallia sanguinolenta, Provancher. One example.

Athysanus exitiosus, Uhler. Common here as in Florida and Jamaica.

Thamnotettix perpunctata, Van Duzee. Several taken on the fine shore grasses.

Tinobregmus vittatus, Van Duzee. Two males, one female and two larvæ. The male has more recently been described by Prof. Osborn. On the mainland it has been taken only in Florida and along the gulf coast.

Jassus olitorius, Say. Common. These were of the typical dark variety found throughout the northern States.

SOME NEW BEES, AND OTHER NOTES.

BY T. D. A. COCKERELL, BOULDER, COLO.

Melissodes dagosa, n. sp.

♂. Length, 10 mm; black, with the clypeus bright lemon-yellow; the labrum (except at extreme sides) and a small spot on the mandibles also yellow; hair of head and thorax abundant, silky-white, without any black; eyes pale greenish; antennæ reaching to metathorax, scape black, flagellum black above, but broadly pale reddish-orange beneath; wings clear, nervures and stigma ferruginous; legs black, with light hair; small joints of tarsi red; hair on inner side of hind basitarsus orange; abdomen with pale hair; hind margin of first segment broadly hyaline; hind margins of segments 2 to 6 with broad, conspicuous white hair-bands; sixth and seventh segments toothed laterally, the teeth short; hind margins of ventral segments reddish-subhyaline. In my table of *Melissodes* (Trans. Amer. Ent. Soc., 1906), this runs to *M. lupina* and *M. agilis*, which it greatly resembles, but from which it differs in the very much shorter antennæ. The middle joints of the flagellum are little more than half as long as they are in those species. The antennæ are also wholly without crenulation.

Hab.—Grand Coulee, Washington State, at Osborn's Ranch, July 8, 1902. (*Wash. Agric. Exper. Sta.*)

April, 1909

Melissodes Tuckeri, n. sp.

♀. Runs in my tables to *M. perplexa*, Cresson, which it very greatly resembles. It differs from *perplexa* and all the allied species by the character of the mesothorax, which is shining, and closely beset with very deep and large punctures. Compared with a co-type of *perplexa*, the abdomen appears at first sight to be the same, but there are the following differences: Dorsal region of first segment, except the apical portion, strongly and quite closely punctured (very feebly in *perplexa*); middle of second segment below the band distinctly though delicately punctured (impunctate in *perplexa*); nude margin beyond the white hair-band on third segment very narrow (broad in *perplexa*). The white hair on second segment takes the form of broad oblique bands at the sides, failing in the middle; this is nearly as in *perplexa*, and entirely different from the straight bands (a broad one basal and a narrow one in middle) of *M. communis*. The legs are practically as in *perplexa*; the hind legs have the scopa very large, strongly plumose, pale ochraceous, with the hair on inner side of hind basitarsus brown-black; the wings are strongly dusky, the tint blackish; tegulæ shining piceous, with a patch of velvety dark fuscous pile, surrounded by pale hairs, in front. The very pale ochraceous hair of the front of the thorax extends back to the level of the tegulæ. The head is like that of *perplexa*, except that the vertex is more strongly punctured, and the flagellum, except at base, is red beneath.

Hab.—Plano (about 17 miles north of Dallas), Texas, October, 1907. (*E. S. Tucker.*)

The bee-fauna of Plano, as shown by Mr. Tucker's captures, includes a mixture of humid and arid region-species, being, in fact, near the borders of these regions. He has taken there and kindly submitted to me *Megachile vallorum*, Ckll.; *M. brevis*, Say; *M. kallstræmiæ*, Ckll.; *Melissodes Hitei* (described as *M. Martini Hitei*, Ckll., but evidently a distinct species), and *Florilegus condigna*, Cresson.

Sphecodes pecosensis, Ckll.

A variety of the female, with the mesothorax even rougher than in the type, and the area of the metathorax more irregularly sculptured, has been taken at Troublesome, Colorado, June 9, by Mr. S. A. Rohwer, and at Florissant, June 14 and 26, by Mr. Rohwer and myself. At Florissant it visits *Ribes vallicola* and *Prunus melanocarpa*. The male has not been described, but specimens were taken at Florissant by Mr. Rohwer, one on sand, two at flowers of *Prunus melanocarpa*, all June 21. This male

agrees with the female in having a strong constriction at the base of the second abdominal segment, and I feel assured that it is correctly assigned to it; but it has all the characters of Robertson's genus *Proteraner*, while the female will by no means agree with Robertson's definition of ♀ *Proteraner*. It appears that *Proteraner* was defined on characters which, in part at least, are only of specific value; either it must be redefined or else dropped. I incline to the opinion that it will prove a valid genus, but further investigation is required.

The Florissant male now assigned to *S. pecosensis* is so close to *Proteraner rhois*, Ckll., that I formerly identified a specimen as that species. On examining the types of *P. rhois*, I find a striking character not mentioned in the original description; the middle femora are much flattened and sharply keeled beneath, with a conspicuous angle near the end of the basal third. In the Florissant ♂ *S. pecosensis* all this is merely suggested by a slight flattening, and there is no definite angle.

Osmia metitia, n. sp.

♂. Length, 10½ mm.; head blackish, with yellow-green tints; thorax very densely punctured, the mesothorax and scutellum yellow-green, the pleura and metathorax blue-green; abdomen with the first segment, especially on the hind margin, yellow-green; the other segments very dark purplish, with the hind margins shining dark bluish-green; venter dark blue; legs black, without metallic tints; face with very abundant long white hair; vertex and thorax above with pale ochraceous hair, not mixed with black, except at sides of vertex; cheeks with long black hair, ochraceous above; pleura with light hair, but a little black in front and behind; lower two-thirds of sides of metathorax with black hair, the upper third with pale; first three segments of abdomen with glittering pale hair, the rest with black, and some black at apex of third, and intermixed at sides of second and third; legs with black hair, but anterior ones with pale hair behind, and middle femora with some pale hairs beneath; tegulae shining black; wings hyaline, very slightly dusky, no strong cloud in the marginal cell; edge of clypeus a little wavy, but essentially normal; antennae ordinary, long, entirely black, third joint shorter than fourth; middle tibial spine very sharp, bent sideways; middle basitarsus normal, but the joints 2 to 4 (especially 2 and 3) swollen and broadened, 2 greatly swollen one side; sixth abdominal segment entire, seventh bidentate; second ventral perfectly normal at apex; third deeply emarginate, the emargination fringed with orange hair; fourth broadly truncate; posterior spur of hind tibia about one-fourth longer than anterior.

Hab.—Boulder, Colorado, at flowers of *Ribes pumilum*, April 17, 1908. (*Glenn M. Hite.*)

The following key separates several males from Colorado, in which the small joints of the middle tarsi are thickened :

- Hair of cheeks and sides of metathorax entirely pale ; insect steel-blue..... *O. universitatis*, Ckll.
 Hair of cheeks and sides of metathorax at least largely black..... 1.
 1. Abdomen beyond first segment very dark purplish, the tint (except on the hind margins) reddish rather than bluish ; second and third joints of middle tarsus obtuse on one side..... *O. metitia*, Ckll.
 Abdomen beyond first segment brilliant deep blue..... 2.
 2. Larger ; hind margins of abdominal segments concolorous with the rest ; second and third segments with a good deal of pale hair..... *O. integrella*, Ckll.
 Smaller ; hind margins of abdominal segments violaceous ; abdomen without green tints..... *O. amala*, Ckll.

In *O. integrella* and *O. amala* the basal nervure meets the transverso-medial ; in *O. metitia* it falls short of it.

These insects show a distinct approach to the group which Robertson named *Centrosmia*, and indicate that the latter can hardly stand as a genus.

SOME RECENT WORK IN HEMIPTERA.

BY J. R. DE LA TORRE BUENO, WHITE PLAINS, N. Y.

Recently, by favour of the authors, I received three interesting papers on the Hemiptera. The most important of these is by the learned Dr. E. BERGROTH, and is entitled "ENUMERATIO PENTATOMIDARUM POST CATALOGUM BRUXELLESEM DESCRIPTARUM," which appeared in the "Annales de la Société Entomologique de Belgique."* Of the other two, one by C. W. Kershaw and G. W. Kirkaldy, "On the Metamorphoses of two Hemiptera-Heteroptera from Southern China," appeared in the Transactions of the Entomological Society of London,† and the other by the latter author, is "A Catalogue of the Hemiptera of Fiji," which appeared in the to us little-known and out-of-the-way publication, "Proceedings of the Linnean Society of New South Wales."‡ To all working

*1908, Vol. XV, pages 132-200.

†1908, pt. 1, pp. 59-62, pls. iv and v.

‡1908, Vol. XXXIII, pt. 2, pp. 345-391, pl. iv.

April, 1909

Hemipterists, Dr. Bergroth's work is indispensable, because it brings down to the end of the year 1907 the important Hemipterous family, Pentatomidæ, listed by Lethierry and Severin only up to 1893. The treatment of the synonymy, new names, and other more or less unsettled questions, is tempered by the author's well-known aversion to what to him appears to be unnecessary radicalism, and in consequence, for reasons satisfactory to himself, he rejects much that to others might seem more or less reasonable. The linear arrangement, as the preface states, is the same as that of Lethierry and Severin for practical reasons, which are sufficiently obvious in view of its character as a sequel to the Brussels catalogue. Another point calling for special mention is that omissions in the former catalogue are made good in this one. Among the omissions of Lethierry and Severin may be cited the following American forms in Gerridæ: *Hydrometra lineata*, Say (now *Martini*, Kirk.), and *Gerris canaliculatus*, Say.

For the convenience of those who may not be in a position to consult this work, the changes, additions and omissions in our North American forms, enumerated by Dr. Bergroth, are here briefly noted :

Subfamily THYREOCORINÆ.

(= *Corimelænidae*, L. & S.)

Thyreocoris, Schrank.

(= *Corimelæna*, White.)

Gillettei, Van Duz.

obtusus, Uhler.

renormatus, Uhler.

Sayi, Van Duz.

|| *albipennis*, Say.

Subfamily SCUTELLERINÆ.

(= *Scutelleridae*, L. & S.)

Tetyra, Fabr.

robusta, Uhler.

Fokkeria, Schouteden.

producta, Van Duz. (*Odontoscelis*.)

= *crassa*, Schout.

Phimodera, Germar.

torrida, Reut.

Euptychodera, Bergroth (n. n.).

(|| *Ptychodera*, Reuter.)

corrugata, Van Duz. (*Phimodera*.)

Vanduzeeina, Schouteden.

Balli, Van Duz. (*Odontoscelis*.)

Subfamily GRAPHOSOMATINÆ.

(= *Graphosomidæ*, L. & S.)*Podops*, Lap.(= *Amaurochrous*, Stål, Schout.)*parvulus*, Van Duz.

(In this genus Dr. Bergroth does not accept the synonymy presented by Schouteden.)

Weda, Schouteden.*Horváthi*, Schout.

Subfamily PENTATOMINÆ.

(= *Pentatomidæ*, L. & S.)*Brochymena*, A. & S.*affinis*, Van Duz.*Peribalus*, M. & R.*abbreviatus*, Uhl. (*Holcostethus*.)

(Omitted by Lethierry and Severin)

tristis, Van Duz.*Chlorochroa*, Stål.(= *Pentatoma*, Fieber.)*Osborni*, Van Duz.*Carpocoris*, Kol.*remotus*, Horv.(This is recorded in all catalogues as *lynx*, from the United States.)*Euschistus*, Dallas.*conspersus*, Uhler.*inflatus*, Van Duz.*politus*, Uhler.*Hymenarcys*, A. & S.*crassa*, Uhler.*Cosmopepla*, Stål.*cærulata*, Mont.*Uhleri*, Mont.*Eusarcocoris*, Hahn.*intergressus*, Uhler.*Thyanta*, Stål.*brevis*, Van Duz.*punctiventris*, Van Duz.*Dendrocoris*, Bergroth.(|| *Liotropis*, Uhler)*contaminatus*, Uhler.*pini*, Mont.*Schæfferi*, Barber.

Brepholoxa, Van Duzee.

Heidemanni, Van Duz.

Subfamily ARMINÆ.

(= *Asopidæ*, L. & S.)

Perilloides, Schouteden.

(N. gen. for *Perillus bioculatus*, Fabr.)

Podisus, H. S.

(Dr. Bergroth does not accept Schouteden's change of this genus to *Apateticus*, Dall.

maculiventris, Say.

(Noted by L. & S. as *spinosus*, Dallas.)

mucronatus, Uhler.

placidus, Uhler.

(Omitted by L. & S.)

Subfamily ACANTHOSOMATINÆ.

(= *Acanthosomidæ*, L. & S.)

Elasmotethus, Fieb., Stal.

(= *Acanthosoma*, for certain American forms.)

Atricornis, Van Duz. (*Acanthosoma*.)

Cooleyi, Van Duz. (*Acanthosoma*.)

Kershaw and Kirkaldy, in their metamorphosis paper have added to our knowledge of Hemipterous life-histories, but that wealth of references which ordinarily characterizes the work of the junior author is regrettably absent. They treat of a Scutellerine and a Coreid, the former *Chrysocoris Stollii*, Wolf, and the latter *Riptartus linearis*, Linné. The female of the first-mentioned lays about a dozen eggs on leaves, mainly belonging to several species of *Glochidion*, on the fruit of which the bug feeds in all stages, although it accepts other fruits. This adaptability to other food than the normal is not uncommon among the Hemiptera, as my observations on *Nezara hilaris*, *Brochymena quadripustulata* and *Acanthocerus galeator* have shown me, for the nymphs of these three species, while in nature feeding on golden-rod, trees and other wild vegetation, all thrive and came to maturity on plants of the cultivated bean. The authors describe the manner in which the eggs are deposited, and note the changes of colour and markings caused by the advancing development of the embryo, a process which can be very readily observed in the white ova of various water-bugs. The nymphs hatch in four days. Unfortunately the number of nymphal instars was not positively ascertained, but I am

inclined to believe that when the life-history is fully worked out they will be found to number five, which, so far as I am aware, appears to be the usual number in Heteroptera, although there are certain exceptions to this rule. Mention is also made of the absence of a distinctive coloration of the nymphs immediately after moults, a fact easily observable in many Hemipterous nymphs. The plate (IV) for this species shows three figures of the egg, the nymph just hatched and the 2nd, 3rd and "penultimate" (4th?), instars of *C. Stollii* and the last-mentioned instar of another species. Two figures of the adult are given, one from above and the other from the side, the latter showing the bug in the natural standing position. In regard to the nymph, the explanation of the plate calls fig. 6 "penultimate instar," while the text calls it "final nymph," which latter it certainly is. To avoid confusion, it seems to me the plate should have termed it "last nymphal instar," which would have been perfectly unambiguous.

Ripartus linearis is treated of with equal succinctness. The bug is vegetarian, and feeds on the seed-pods of various *Leguminosæ*. The cauldron-shaped dark bronzy-brown, sometimes pruinose ova, are deposited irregularly on the stems and leaves of the food-plant. One batch of 11 deposited on September 30th was observed, which gave adults on October 23rd following, which is to say, in 23 days, a remarkably short developmental period for Heteroptera, to be explained by the favourable conditions of heat and moisture, since it would appear that the period of abundance of the insect is the wet season. In our Northern latitudes these changes take longer, although it should be noted that certain *microvelia* are equally rapid in their transformations in the immediate vicinity of New York. The changes in nymphal colouration of *Riptortus* are noted, and also its resemblance in all nymphal instars to ants. In this it is like our common northern *Alydus curinus*, the blackish nymphs of which very strongly simulate our large black *Camponotus pennsylvanicus*, and are very often taken with it in clover patches in fields. Whether this resemblance is protective or not would be very hard to say, as the authors remark in regard to *Riptortus*. The number of moults is given as four, with the corresponding number of nymphal instars. It might seem, perhaps, that some moult has passed unnoticed, possibly the first one, because the cast skins are then very diaphanous and fragile. I know *positively* of only one Heteropteron with only four nymphal instars, and this I have bred a number of times to ascertain beyond doubt that it was an actual fact, and not a mere error of observation.

I do not wish to be construed as wantonly criticising a paper that distinctly adds to our knowledge, but the facts as stated are so at variance with my personal observations that I must ask my friends to look again. The best way would be by isolating single nymphs and carefully following each through all instars. The plate of this life-history is more satisfactory than the other, although both are excellent. It depicts the ova, three nymphal instars, and the adult, and from these figures one is struck with the great similarity of the species to our native forms of *Alydus*. On the whole, as an addition to our knowledge of life-histories in a much-neglected group, this paper is of value. A more profound study of nymphal variations in structure and appendages would have greatly enhanced its importance, but knowing as I do, the difficulties incident on such work it is only bare justice to commend highly the good beginning made.

The *Catalogue of the Hemiptera of Fiji* is conceived and carried out in the spirit of accuracy so characteristic of its author's work, and reflects his well-known views on phylogeny and synonymy, the arrangement of the Heteropterous families being that he has adopted for his forthcoming catalogue. This paper is based on the collections made by Koebele and Muir when searching for parasites to control the sugarcane leaf-hopper, and includes an account of some Hemiptera from Charles H. Knowles, Superintendent of the Department of Agriculture of Fiji. The previous total of 40 Hemiptera known from the Islands is increased to 205, but he says, it is evident that the endemic forms are scarcely collected. "Fiji was associated, by Wallace, with the Pacific Islands, in a 'Polynesian sub-region,' but its Hemipterous fauna seems decidedly continental, and to be included in the 'Austro-Malayan Sub-region' of the Australian Region."

Eleven genera and thirty-four species are described as new. The catalogue is enriched by notes on food-plants, habits, occurrence, description of nymphs, and other valuable details. The plate figures the widely-distributed *Orthæa* (= *Pamera*) *vincta*, Say, brachypterous adult, nymph, and tegmen of macropterous form; *Brachylybas variegatus* from above and from side, together with the odoriferous orifice, much enlarged; *Ontiscus vitiensis*; the tingids *Mesocypselas dicysta* and *Holophygdon melanesica*, from above and from side; and the hemelytra of *Ploiariodes medusa*. Taken as a whole, this is a most important addition to our knowledge of the Hemipterous fauna of the Pacific Islands.

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No. 5.

ON THE ORTHOPTERA OF NORTHERN ONTARIO.

BY E. M. WALKER, TORONTO.

The few published records in Orthoptera from Northern Ontario are based on odd captures made by a number of collectors in various localities, no local lists having been published from any point north of Algonquin Park, where the writer collected in 1902 and 1903, and listed the species taken there in the 36th Ann. Rep. Ent. Soc. Ont. (1905). As Algonquin Park lies at the extreme southern limit of the Canadian Zone, its biota containing many Austral elements, we have still only a very fragmentary knowledge of the Orthopterous fauna of the strictly Boreal parts of the Province.

Since the Algonquin Park list appeared, the writer has collected Orthoptera in three localities in Northern Ontario, all situated well within the limits of the Canadian Zone. These are Fort William and Nipigon, Thunder Bay District, and the Temagami Forest Reserve, Nipissing District. Only a few days at the end of August, 1907, were spent at Fort William and Nipigon, and this brief time was occupied chiefly in collecting the species of the Odonate genus *Aeshna*; nevertheless, it is believed that nearly all the species of Orthoptera resident there were taken, though none in large series. In the Temagami District a fortnight's canoe-trip was made in the first half of September, 1908, and good opportunities for collecting were afforded.

To make the list as complete as possible the names have been added of a few other species previously known from Northern Ontario, which were not taken at the localities mentioned. A few others, not included in the list, have been taken at North Bay, Lake Nipissing, but probably do not range much further north, and are, perhaps, better excluded from the fauna of the Canadian Zone.

The combined result of these various records is, on the whole, what one would expect, judging from our knowledge of the Orthoptera of Northern Michigan as embodied in the following papers :

- 1898.—Blatchley, W. S. Two *Melanopli* from Les Cheneaux Islands, Michigan. *Psyche*, VIII, pp. 195-197.
- 1904.—Rehn, J. A. G. The Orthoptera of Keeweenaw Bay, Michigan. *Ent. News*, XV, pp. 229-237 and 263-269.
- 1906.—Morse, A. P. The Ecological Relations of the Orthoptera of the Porcupine Mountains, Mich. From "An Ecological Survey of Northern Michigan." C. C. Adams, in *Rep. Geol. Surv. Mich.*, 1905. (Includes also two species from Isle Royale, Mich.)
- 1909.—Hebard, Morgan. Additional Notes on the Orthoptera of the Keeweenaw Bay Region of Baraga Co., Mich. *Ent. News*, XX, pp. 155-158.

The Keeweenaw Bay list corresponds closely to that of the Thunder Bay District, Ont., the only species in the former not included in the latter being the introduced *Periplaneta Americana* and *Tetrix Luggeri*, whose claim to specific rank is questionable. Only four species from the Thunder Bay District are not reported from Keeweenaw Bay. The list from the Porcupine Mountains and Isle Royale is also of a similar character so far as it goes, but contains the additional species, *Melanoplus amplexans*, Scudd.; *Atlanticus pachymerus*, Burm., and *Ceuthophilus seclusus*, Scudd., all of which are Austral forms, whose occurrence in this northern locality is somewhat surprising.

In comparing the present list with that of Algonquin Park, we again find a considerable correspondence, but in the latter locality there are a number of Austral or Transitional forms, namely: *Tettigidea parvipennis*, Harr.; *Chortophaga viridifasciata*, De Geer; *Spharagemon Bolli*, Scudd.; *Scudderella furcata*, Brunn.; *Orchelimum vulgare*, Harr.; *Xiphidion brevipes*, Scudd.; *Nemobius palustris*, Blatchley, and *Ceantus fasciatus*, Fitch. Of the several western types in the other lists mentioned, only two were taken here, *Melanoplus Bruneri* and *Tetrix Brunneri*, both of which were quite local in occurrence. It may be mentioned, however, that another of the western forms, *Chloëaltis abdominalis*, has been recorded from the Severn River, about 40 miles south-west of Algonquin Park.

While the general characteristics of the Orthopterous fauna of Northern Ontario are thus quite in accord with what we should naturally expect, there are certain peculiarities worthy of special notice when we come to consider the various localities separately.

At Fort William the collecting was all done on the west side of the Kaministiquia River. We crossed the river in a skiff and followed a road

about a mile and a half over a stretch of level country to the foot of Mt. McKay. This flat area is open and prairie-like for a distance of several hundred yards west of the river, beyond which it is a dense spruce swamp, broken only by the clearings of an Indian village, which are scattered along each side of the roadway. At the foot of Mt. McKay we left the road and followed a footpath up the mountain.

Mt. McKay is a bold basaltic cliff rising suddenly out of the level spruce swamp around it to a height of about 1,000 feet, its sides very steep, and in many places quite perpendicular. The summit is about 1,600 feet above sea level.

Following the path up a steep slope wooded with a mixed growth of small spruce, canoe birch, aspen and a few scattered white pine, we reached, when about half way to the summit, a small treeless plateau, some seventy-five square yards in area, and covered with short grass and small herbaceous plants. This proved an interesting spot for Orthoptera, and will be referred to again in discussing the fauna of this region.

Above the plateau the sides of the mountain are for the most part almost vertical, but we followed a level pathway for some distance through the woods, and then completed the ascent by scrambling over the slabs of a talus slope, finding ourselves at the summit in a scrubby wood of Banksian pine, poplar, birch, etc., with small scattered openings, which yielded good results in Orthoptera.

The prairie-like area adjoining the river would have repaid a longer visit than the few minutes we were able to spend there. The most noteworthy capture made here was that of the interesting northern Dectician, *Idionotus brevipes*, Caud., which is not uncommon on the prairies of Manitoba and ranges westward to Calgary, Alta., and northward into Arctic America. *Mecostethus gracilis* was common here, and, in fact, in open places everywhere in this locality. *Chlœaltis abdominalis*, *Stenobothrus curtippennis*, *Melanoplus femur-rubrum*, *extremus* and *bivittatus* were also quite common.

The road through the spruce swamp was drained on each side by ditches, which were full of water, and along which certain dragon-flies were skimming back and forth in considerable numbers. The rank growth of bushes and weeds along these did not yield much of interest in Orthoptera, the chief species found here being *Scudderia pistillata*, *Mel. bivittatus*, *Mel. extremus* and *Stenobothrus curtippennis*. From openings in the

spruce swamp *Podisma glacialis Canadensis*, *Mel. islandicus* and *Tetrix granulatus* were taken.

At the foot of the mountain is an area of exposed rock, on which *Circotettix verruculatus*, *Camnula pellucida*, *Mel. atlanis*, etc., were very abundant. On the shady path up the mountain-side the only Orthopteran met with was *Mel. islandicus*, which was not uncommon, but when we reached the plateau referred to above, we found *Chlœaltis conspersa*, *C. abdominalis* and *Sten. curtipennis*, long- and short-winged forms of each; *Mel. extremus* and *fasciatus*, long-winged; *Circotettix verruculatus*, *Camnula pellucida*, *Melanoplus atlanis* and *Tetrix acadicus*. On the top of the mountain both forms of *Mel. fasciatus* and of the two species of *Chlœaltis* were common, especially the long-winged form of the first-named and that of *C. abdominalis*. A few females of *Mel. altitudinum* and many specimens of *Mel. islandicus* were also taken here.

The country about Nipigon is rugged and picturesque, and wooded with heavier timber than grows in the vicinity of Ft. William. We saw many large white spruce, aspen, balsam poplar and canoe birch, and the vegetation is, generally speaking, more luxuriant than in most parts of Northern Ontario along the Canadian Pacific Railway. The Nipigon River above the Railway Bridge flows swiftly between steep clay banks over a hundred feet high, but a little below it there is a waterfall, after which it flows placidly out to Lake Superior, the banks sloping gently to the water's edge, which is bordered by low bushy pastures and damp woods. Here and there open reedy marshes jut out into the river, and, not far below the fall, there is an island consisting of a narrow strip of tamarack swamp surrounded by a broad belt of open, partly submerged, marsh. This marsh yielded the only species of Orthoptera, *Mecostethus lineatus*, not found at Fort William, and was a wonderful locality for dragon-flies.

The Orthoptera here are practically the same as those found at Fort William. The most noticeable feature was the abundance of *Mel. Bruneri*, which, with *Camnula pellucida*, was the common campestral species, especially on dry soil. *Mel. atlanis* was quite local, and *M. femur-rubrum* does not seem to have been observed at all. The same tendency towards the development of macropterous or long-winged individuals in species usually regarded as normally brachypterous or short-winged was observed here, though apparently not in such a marked degree as upon Mt. McKay.

This development of macropterism in so many species usually regarded as normally brachypterous is the most interesting feature in the Orthoptera of the Thunder Bay District. We find the same tendency in less degree in Northern Michigan, as given in the papers cited above, but farther south long-winged examples of some of these same species are unknown, or of such rare occurrence that they are usually considered somewhat abnormal and as representing cases of reversion to an ancestral type. Such species are, e. g., *Chlœaltis conspersa*, *C. abdominalis*, *Melanoplus fasciatus* and *M. extremus*, though in the last named species the macropterous form is relatively common. The question arises: Why is the proportion of macropterous to brachypterous individuals so much greater in these northern regions than it is farther south?

In the first place, where dimorphism in wing-length occurs the fully-winged type is of course the more primitive one, the flightless type the more recently evolved. The species is tending to become wingless, and the short-winged individuals are therefore better adapted to their environment, while the long-winged individuals are gradually becoming eliminated. Where this process has been most completely carried out only the flightless type remains, and in such cases the species may be apterous, as in *Podisma glacialis*, or extremely brachypterous, the wings remaining as mere vestiges, as in *Melanoplus islandicus*.

Now, where the environment is least favourable to the needs of the species, or where favourable conditions are localized, the elimination of the unfit will proceed more rapidly than it will under favourable conditions, so that we might, *a priori*, expect to find that where the trend of evolution is towards brachypterism this condition will become established most rapidly where favourable conditions of environment are localized, e. g., towards the limits of the geographical range of the species.

It will be noted that all the dimorphic species in question are boreal forms, and are more abundant and generally distributed in the north, where the long-winged forms are plentiful, than towards the southern limits of their geographical range, where this form occurs only sporadically or not at all. Hence it may be concluded that the elimination of the less fit macropterous forms at the south, where the environment is least suited to the species, has been more complete than in the north, where the conditions are more favourable.

There is possibly another factor entering into this question. It is well known that differences in wing-length are correlated with differences

in habitat, and that the habitat of a given species may vary somewhat in different parts of its geographical range. Morse has pointed out that, generally speaking, species inhabiting thickets, edges of woods, etc., are flightless, and either brachypterous or apterous, while those frequenting open places, such as fields, deserts, or exposed rocky surfaces are macropterous, and capable of more or less sustained flight. The dimorphic species in question are restricted in the south to thicket habitats, but in the north, where they are more generally distributed, they occur also, to a greater or less extent, on campestral stations. Hence the macropterous type may be here preserved in adaptation to the campestral habitat.

To what extent this campestral habit actually exists and whether it is a real factor in preserving the macropterous type in these species we are not in a position to say. We have not enough knowledge of the ecology of these species in the north to make any positive statements on the subject. A few facts may be given, however, which seem to lend some support to this view.

Chlœaltis conspersa, which Rehn has recorded from the cool bogs of the pine barrens of northern New Jersey (Ent. News, 1902, p. 310), in the Upper Austral Zone, occurs about the edges of woods and in thickets in the Transition Zone; and Hebard found it at Pequaming, Northern Michigan, "about brush heaps and stumps in *open fields and pastures*" (Rehn, Ent. News, 1904, p. 233). I have also taken it in similar places in the Canadian Zone in Ontario. On account of its egg-laying habits, however, this species probably never strays far from the borders of woods.

At Fort William, where it is dimorphic, *Chlœaltis abdominalis* was heard stridulating in the open grassy plain on the west side of the Kaministiquia River, and specimens were taken on the plateau, half-way to the top of Mt. Mackay. The conditions here were truly campestral, but the plateau was nearly surrounded by woods, and was so small that not much importance can be attached to the presence of the locusts here.

Melanoplus fasciatus and *extremus*, both dimorphic at Fort William, are certainly more generally distributed here than they are farther south; e. g., in the Georgian Bay region. Long-winged males of the former were found flying about the bare talus slope on the side of Mt. McKay, a type of habitat which this species does not frequent in the Transition Zone, where macropterous individuals are very rare. The long-winged male of

M. extremus is said to be the prevailing, if not the exclusive form at high altitudes and latitudes, and the same form of the European locust, *Chrysochraon brachyptera*, a relative of our *Chlœaltis*, is likewise said to be common in damp alpine meadows at considerable heights.

Another feature of interest in the fauna of Fort William and Nipigon is the total absence of Gryllidæ. Low, grassy, partly wooded pastures on the Nipigon River, in every way resembling the favourite haunts in the more southern parts of Ontario of *Nemobius fasciatus* and *N. carolinus* (= *N. angusticollis*, Walk.), were searched for these crickets in vain; nor could the chirping of any Gryllid be heard either by day or night. In fact, the only Orthopterous sound which was heard at night in this district was the occasional "zeep, zeep, zeep, zeep" of the Northern Katydid (*Scudderia pistillata*). During the day, however, the chorus of Orthoptera rivals that of more southern latitudes in the volume of sound produced, though considerably different in quality. Instead of the chirp of *Gryllus*, and the low undertones of *Nemobius*, and the familiar "ze-e-e . . . jip, jip, jip" of *Orchelimum vulgare*, we hear on every side the loud, but not especially harsh, "shkclip—shkclip, shkclip, shkclip" of *Mecostethus gracilis*, the lower-toned but more rapid and harsher "z-z-z-t, z-z-z-t, z-z-z-t" of *Chlœaltis abdominalis*, and the similar, but more subdued, notes of its congener, *C. conspersa*, varied by the still softer tones of *Stenobothrus curtipennis*. An occasional "tsip!" the day note of *Scudderia pistillata*, and the feeble little trill of *Xiphidium fasciatum*, which is only audible at close range, complete the orchestra of this northern region, except in the open bare rocky or sandy places, where *Circotettix verruculatus* keeps up its incessant clatter, and in the open grassy plains at Fort William, where a new and unfamiliar note was heard, leading to the discovery of the Dectician *Idionotus brevipes*. This note is a continuous and monotonous trill, resembling that of *Orchelimum vulgare*, with the "jips" omitted.

Turning now to the Temagami District, we find quite different conditions as regards the Orthoptera. The chief interest possessed by this district in this regard lies in the fact that it is still largely covered with primeval forests, and thus represents entomologically the conditions which once obtained over a large part of the country.

Even Nipigon, though well wooded, has apparently been sufficiently cleared to have brought about an immense increase in the number of individuals of almost all the species native there. In the virgin forests

of Temagami the paucity of insect life, and notably of Orthoptera, was somewhat surprising to one who had never been in a large tract of such country before. One does not expect to find many Orthoptera in a dense northern forest, but not only were the deep woods utterly devoid of them, but even the clearings and open bushy hillsides, such as support multitudes of locusts in a more open country, would generally yield only a few *Mel. atlantis*, *femur-rubrum* and *islandicus*, and *Camnula pellucida*.

The only stations on our route where the common campestral species were found in abundance were the fields and pastures about the village on Bear Island, and in a less degree the clearing on Temagami Island, where the Temagami Inn stands. On Bear Island, for instance, *Mel. bivittatus*, *femur-rubrum* and *atlantis*, *Dissosteira Carolina*, *Camnula pellucida*, *Gryllus Pennsylvanicus* and *Nemobius fasciatus* were all found in their usual abundance, but, strange to say, *Stenobothrus curtipennis*, *Mecostethus gracilis* and *Mel. extremus* were not taken here nor anywhere in the district. The absence of the first-named abundant and widespread species is particularly surprising.

Even the open marshes were extremely unproductive of Orthoptera, for they usually support a growth composed largely of horse-tails (*Equisetum fluviatile*), and sedges, especially the coarse species, *Dulichium arundinaceum*, with but very few grasses. A few *Mecostethus lineatus* in favourable spots, *Scudderia pistillata* and an occasional *Mel. bivittatus*, *femur-rubrum* or *Xiphidion fasciatum* seem to be about the only species which inhabit these swamps.

The Sphagnum bogs are likewise almost barren of Orthoptera, and when covered with Ericaceous shrubs, such as Dwarf Cassandra, Andromeda, Sheep-laurel, etc., the only species likely to be met with is *Scudderia pistillata*.

In general it may be said that the Temagami fauna, in addition to its striking poverty in both species and individuals, differs from that of Fort William and Nipigon chiefly in the absence of most of the western types and certain other species which are common there, and in the presence of the three common ground-crickets, *Gryllus Pennsylvanicus*, *Nemobius fasciatus* and *N. Carolinus*.

(To be continued.)

NOTES ON TENTHREDINOIDEA, WITH DESCRIPTIONS OF
NEW SPECIES.

BY S. A. ROHWER, BOULDER, COLO.

Paper V.

(New Western Species.)

Erythraspides Tuckeri, n. sp.—Female: Length, 5 mm. Habitus normal for members of this genus. Anterior margin of the clypeus dullish by irregular patches of punctures. Middle fovea well defined, rounded above, open below. Ocellar basin not well defined, represented by two channels meeting above the anterior ocellus. Lateral furrows reduced to two distinct rounded fovea. Third antennal joint as long as four plus five. Mesothorax shining, the anterior part of the anterior lobe of the mesonotum with some close punctures. Scutellum more or less punctured, the sides smooth and shining. Claws with a distinct inner tooth almost bifid. Stigma very large, broadest at the base, tapering to an acute apex. Sheath large, straight above, rounded below. Colour black; tegulæ, tips of the femora (the four anterior ones more broadly so), tibiæ except the apices *white*. Tarsi dusky. Sparsely clothed with white pubescence. Wings hyaline; venation brown.

Type locality: Lawrence, Kansas. One specimen collected by Mr. E. S. Tucker in April.

This species differs from *Ashmeadi*, Kincaid (Alaska), in not having the scutellum granular, the stigma is angled at the base below, etc. It has some general resemblance to *Blennocampa adusa*, Macg., but the posterior femora are black.

Tenthredo sectiliformis, n. sp.—Female: Length, 9 mm. Clypeus semicircularly emarginate, the lobes broad, rounded. Occiput with a weak but distinct margin; lateral ocellar furrows strong; frons strong; interocellar furrow well defined. Antennal joint three longer than four, but not quite as long as four plus five; joints three to seven spined at the tip beneath; apical joint about the same length as the preceding one. Head shining, not strongly sculptured. Dorsulum opaque, rather closely granular; scutellum granular, as is also the postscutellum; postscutellum with a middle carina. Claws deeply cleft, the inner tooth the shorter. Stigma not strongly beneath; venation normal. Sheath broad, straight above, rounded beneath, with an apical fringe of hair. Colour black; most of the clypeus, labrum and mandibles (except the tips), and

a small spot above the posterior coxæ, *yellowish-white*. Legs (including the coxæ), except the apex of the posterior tibiæ and all of their tarsi, and the abdomen, except the apical segment, *clear rufous*. Wings hyaline, with a faint yellowish tinge; venation brown.

Type locality: Florissant, Colo. One female collected on the foliage of *Salix brachycarpa*, July 7, 1907, by S. A. Rohwer.

This species is close to *T. secilis*, Cresson, but differs in having the coxæ and the trochanters rufous, the legs are not pale beneath, and the tegulæ are black.

Tenthredo alpestris, n. sp.—Male: Length, 7 mm. Clypeus semicircularly emarginate, the lobes broad, rounded. Antennal frons strong; occiput margined; lateral ocellar furrows strong; interocellar furrow wanting. Third antennal joint about as long as four plus five; the joints not spined beneath; the apical joint equal with the preceding. Anterior lobe of the mesonotum granular, dullish; the lateral lobes shining, sparsely punctured. Scutellum with rather close, large punctures, and a middle carina. Inner claw tooth stouter and a little shorter than the outer. Stigma rounded beneath; venation normal. Black, yellow and rufous. Head below the antennæ, two small spots above each antenna, inner orbits to the summit of the eyes, outer orbits to about the middle of the eye, most of the prothorax, tegulæ, anterior part of the scutellum, mesopleura and pectus, two large spots above the posterior coxæ, and a spot on the basal plates, *yellow*. Abdomen beyond the basal plates clear rufous. Legs: coxæ (a black line above on the posterior pair), trochanters, except a black line above, four anterior femora, except a black line above, anterior tibiæ and tarsi, except a line above, *yellow*; the posterior legs below the coxæ, except a line above on the femora above at the base, and the intermediate legs below the femora, *rufous*. Wings hyaline, iridescent; venation brown.

Type locality: Florissant, Colo. One male collected on foliage of *Salix brachycarpa*, June 16, 1907, by S. A. Rohwer.

This species is perhaps closest to *T. suavis*, Cresson, but it is much smaller, and the postscutellum and most of the scutellum is black, and the abdomen is not "yellowish-white." It may be known from *frigida*, Macg., by the eyes slightly converging below, the longer third antennal joint, etc.

Tenthredo hypoleuca, n. sp.—Male : Length, 9 mm. Clypeus semicircularly emarginate, the lobes broad, rounded. Eyes distinctly converging below, yet not strongly so. Occiput margined; frons strong; lateral ocellar furrows distinct, opposite the lateral ocelli they broaden slightly, then narrow again, interocellar furrow faint. Antennal joint somewhat nodose at the apex; joint three not quite as long as joint four plus five. Head shining; dorsulum and scutellum shining, with separate distinct punctures; postscutellum rough, slightly carinated. Inner claw tooth about the same length as the outer. Lower margin of the stigma almost straight; venation normal. Black, white and rufous. Clypeus, labrum, mandibles (the apices piceous), spot at lower corner of eyes, palpi, posterior angles of the pronotum, tegulæ, the lower half of the pleura and pectus, a spot on the basal plates, *white*. Abdomen beyond the first segment rufous, the venter somewhat whitish. Legs: coxæ, trochanters, four anterior femora, tibiæ and tarsi, except a black line above, *white*; posterior femora and the posterior tibiæ beneath *rufous*; the rest of the legs black. Wings hyaline, iridescent; venation dark brown.

Type locality: Florissant, Colo. The type collected July 11, 1907, at flowers of *Heracleum lanatum*, and a paratype swept from the meadow, July 7, 1907, by S. A. Rohwer.

This species resembles *T. Slossoni*, Macg., but the clypeus is semicircularly emarginate, the intermediate femora are not rufous, the markings white, etc. It is also related to *T. signatus*, Nort., but the antennæ are not pale beneath, the white of the pleuræ and the pectus are confluent, etc.

Tenthredo messicæformis, n. sp.—Male: Length, 9 mm. Clypeus semicircularly emarginate, the lobes rather narrow, rounded. The occiput margined: frons strong; lateral ocellar furrows well defined; interocellar furrow present but faint. Antennæ simple, tapering to the apex; joint not as long as joints four plus five; apical joint a little shorter than the preceding one. Head shining; dorsulum and the scutellum rather coarsely granular; postscutellum granular and carinated. Teeth of the claws about equal. Stigma almost straight on the lower margin; venation normal, Black, yellow and rufous. Clypeus, labrum, mandibles (the apices piceous), spot between the antennæ beneath, a small spot above each antenna, cheeks below the middle of the eyes, posterior angle of the pronotum, tegulæ, lower angle of the prothorax, a broad line on the

pleura, pectus, two lines above the posterior coxæ, and a spot on the basal plates, *yellow*; abdomen rufous. Legs, except a black line above, *yellow*, the posterior tibiæ are slightly reddish. Wings hyaline, iridescent; venation dark brown.

Paratypes differ in having the spot between the antennæ wanting, and the yellow of the posterior tibiæ replaced by rufous.

Type locality: Florissant, Colo. Two females collected July 11, 1907, at flowers of *Heracleum lanatum*, by S. A. Rohwer. Other specimens from: Four males, top of Las Vegas Range, N. M., alt. about 11,000 ft., June 28 (T. D. A. Cockerell); thirteen males, Ute Creek, Costilla Co., Colo., alt. 9,000 ft., July, 1907 (L. Bruner and R. W. Dawson); one male, Sierra Blanca, Costilla Co., Colo., alt. 10,000 to 11,500 ft., July 20, 1907 (L. Bruner); one male, Pike's Peak, Colo., alt. 10,000 ft., July 20, 1906 (L. Bruner).

This species is close to *T. messica*, Macg., but differs in having the third antennal joint not twice as long as the fourth, and there is a spot above the anterior coxæ, and a vertical line below the posterior wing.

Tenthredo semirubra, Norton.--What I take to be the male of this species has the following characters worth noting: Length, 10 mm. Clypeus almost squarely emarginate; the lobes broad, rounded. Frons rather strong; lateral ocellar furrows strong; occiput faintly margined; interocellar furrow wanting. Third antennal joint not as long as four plus five; apical antennal joint equal in length with the preceding. Dorsulum and scutellum dullish, with rather close, distinct punctures; the scutellum posteriorly with a faint carina. Stigma a little wider at the base. Inner claw tooth much shorter than the outer. Black; clypeus, labrum, mandibles (apices piceous), four anterior tibiæ and tarsi, *yellowish-white*; abdomen beyond the second segment rufous. Wings dusky hyaline; venation dark brown.

I have six males of the above from Florissant, Colo., July 7 to 14, 1907, at flowers of *Heracleum lanatum* (S. A. Rohwer). This species was known previously from Canada and Massachusetts.

Allantus subnigriceps, n. sp.—Female: Length, 11.5 mm. Habitus in general much like *nigriceps*, Cresson. Clypeus subsemicircularly emarginate, the lobes broad, rounded at the apex; labrum long, rounded at the apex; the clypeus and labrum shining, with a very few punctures. Interocellar furrow almost wanting; lateral ocellar furrows obsolete below

the lateral ocelli. Head very closely, coarsely punctured, the area behind the superior orbits somewhat more sparsely so, the vertex with the punctures larger. Antennæ nine-jointed, the apical joint very short and almost wanting; the antennæ clavate, the club, which is flattened and concave below, begins with the fifth joint. The thorax closely, coarsely punctured, the anterior lobe a little more sparsely so; the posterior part of the scutellum with a median carina. Venation normal. Claws with an inner tooth near the apex. Sheath subparallel margined, obliquely truncate at the apex. Black; clypeus, labrum, mandibles (apices piceous), posterior margin of the pronotum, propleura, anterior part of the scutellum, a spot above the posterior coxæ, apical margin of the basal plates, apical margin of the dorsal and ventral abdominal segments (the band on the first dorsal is interrupted in the middle), *straw-yellow*. Legs black; anterior femora beneath and at the apex, intermediate femora beneath, all the tibiæ and tarsi, *straw-yellow*; the apex of the posterior tibiæ and their tarsi dusky. Wings yellowish; venation luteous and brown, the stigma luteous.

Type locality: Ormsby Co., Nevada (C. F. Baker).

This species is close to *nigriceps*, Cresson, but when compared with specimens collected in the same locality by Prof. Baker, the following differences are to be noted:

nigriceps, Cress.

1. Lateral ocellar furrows extending beyond the lateral ocelli.
2. Cheeks and vertex shining, rather finely sculptured.
3. Labrum broader and more curved at the sides.
4. Antennæ not clavate, not concave beneath, nine joints.
5. Postscutellum with a median carina.
6. Teeth of the hind tarsal claw about equal.

subnigriceps, Roh.

1. Lateral ocellar furrows extending to the lateral ocelli.
2. Cheeks and vertex dulled by the coarse sculpture.
3. Labrum narrow and at the sides nearly straight.
4. Antennæ clavate, the club flattened and concave beneath, the ninth joint very small.
5. Postscutellum and the posterior part of the scutellum with a median carina.
6. The inner teeth of the hind tarsal claw shorter and stouter than the outer.

A NEW COCCID FROM NICARAGUA.

BY T. D. A. COCKERELL AND W. W. ROBBINS, BOULDER, COLO.

The Coccidæ of Nicaragua are practically unknown ; it is therefore not at all surprising that a species collected there, kindly transmitted to us by Prof. C. F. Baker, proves to be undescribed.

Mesolecanium perditulum, n. sp.

♀.—Scale, $2\frac{1}{2}$ – $2\frac{3}{4}$ mm. long, $2\frac{1}{4}$ or a little less broad, about $\frac{1}{2}$ to $\frac{3}{4}$ mm. high ; subcircular, flattish, very dark reddish brown, almost black, moderately shiny, rough but not pitted, marginal plications few and obscure. Immature and parasitised scales are often light ferruginous. (The parasite is a Chalcidid.) Skin with scattered minute circular glands ; submarginal area with moderately large gland-pits ; stigmatal spines very short, not projecting beyond margin ; caudal slit evanescent (the sides coalescing) in mature specimens. The measurements of the antennæ, legs, etc., are all in micromillimeters. Anal plates with the inner side about 132, anterior outer side 117, posterior outer side 87, the lateral corners obtusely rounded ; distance from tips of plates to hind end 460 to 545 ; digitules of tarsus slender, about 27 long ; claw-digitules curved, about 27 long, not very stout ; claws ordinary. Middle leg with coxa about 119, femur + trochanter 136, tibia 102, tarsus 59. Antennæ 7-jointed, with joint 3 very long ; joints measuring (1) 45, (2) 33–37, (3) 102–105, (4) 20–25, (5) 25, (6) 18, (7) 30.

Hab. — Quesalquaque, Nicaragua, Jan., 1902, on bark of small branches of tree No. 2122 (C. F. Baker). The bark is very pale reddish.

Closely related to *M. perditum* (Ckll.) from Yucatan, but smaller and flatter, and differing in various minor details.

A NEW GALL-GNAT ON ARTEMISIA.

BY T. D. A. COCKERELL, UNIVERSITY OF COLORADO.

A short time ago I received from Mr. E. Bethel a large number of galls collected on *Artemisia frigida* in the vicinity of Denver, where he tells me they are very common. During the last days of March the flies emerged in quantities, and prove to belong to a new species.

Rhopalomyia Betheliana, n. sp.

Galls about 3 mm. long and 2 broad, pyriform, with the large end basal and the apex truncate ; pale ochreous, with some white tomentum. They are deformed fruits.

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Pupa bright orange-scarlet, with a pair of prominent anterior projections.

Female 2280 μ long, of which 500 μ is ovipositor; antennæ 16-jointed, the joints practically sessile; length of antennæ about 730 μ ; wing 1530 μ long (but the ♀ varies in size, a small one having the wing only 1360, a large one as much as 1785); thorax small, only 425 μ long. Thorax black or almost; legs and antennæ pale; abdomen in life bright scarlet. Wings normal; angle formed by third vein, and margin above scarcely short of a right angle; distal part of third vein faint. Fringe very long, some of the hairs exceeding 170 μ .

Male.—Differs by the longer legs and the cylindrical brown abdomen; claspers stout, obtuse. The femora measure in μ : anterior, 830; middle, 800; hind, 1000. Antennæ 16-jointed; middle joints with bulb about 60 μ , and pedicel 40; the hairs on bulb about 140. Scutellum prominent in both sexes.

In Dr. Felt's table (N. Y. State Mus. Bull. 124) it runs to the group of *R. antennariæ* and *R. alticola*, but is distinct from these. *R. alticola* is common in Colorado, making a quite different sort of gall, on *Artemisia Canadensis*.

Another new species of *Rhopalomyia*, collected at Boulder, will be described by Dr. Felt.

TWO NEW BEES OF THE GENUS PERDITA, VISITING BAILEYA IN NEW MEXICO.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

Perdita baileyæ, n. sp.

♂.—Length, about 6½ mm.; head and thorax shining dark bluish-green (vertex dull and yellower green), with copious white hair; eyes dull pea-green; cheeks unarmed; mandibles (except tips), labrum, clypeus (except the usual dots, and more or less of the upper edge) and lateral marks all *creamy-white*; lateral marks filling the space between clypeus and eye below, but ending abruptly just below level of upper edge of clypeus, except for a very fine streak which runs a short distance up the orbital margin; antennæ pale yellow basally and orange apically, the scape black above, and the first few flagellar joints more or less ringed with blackish above; upper edge of prothorax, tubercles, and spot on the hyaline tegulæ, *cream-colour*; pleura without light markings; wings milky hyaline, stigma light yellow, nervures white; marginal cell with the poststigmatal portion

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much the longest ; second recurrent nervure evanescent ; legs with much white hair ; femora black (anterior ones metallic behind), with the apices yellow, and a broad light yellow band in front on anterior and middle pair ; anterior and middle tibiæ yellow, with a large dark patch behind ; hind tibiæ dark, with the base and the inner side light yellow ; tarsi yellowish-white, hind ones more or less darkened and reddened ; abdomen black, with white bands, which are partly or wholly interrupted sublaterally ; band on first segment twice as broad at sides as in middle, but sublaterally reduced to a hardly visible line by a rounded invasion of the black ; bands on second and third excavated in the middle anteriorly, and with a large black spot on each side sublaterally ; bands on fourth and fifth deeply emarginate, almost interrupted, sublaterally ; that on sixth reduced to a hardly visible marginal line ; venter black, with obscure linear white bands. In my table in Proc. Phila. Acad., 1896, this runs to 64, and runs out because of the conspicuous white abdominal bands. It is considerably larger than *P. albovittata*, Ckll., and *P. callicerata*, Ckll., which also visit the *Baileya*, but is related to them, and combines some of their characters. There is some resemblance to *P. perpulchra*, Ckll., but in that insect the male has the face all light.

Hab.—Mesilla, New Mexico, at flowers of *Baileya multiradiata*, June 30, 1897 (*Cockerell*). Two males.

Perdita callicerata, var. *leucura*, n. var.

♀.—Length slightly over 5 mm. ; head and thorax very hairy ; clypeus white, with the usual dots ; lateral marks white, tapering above, to end in sharp points on orbital margin near lower ends of facial foveæ (a little above level of antennæ) ; antennæ coloured as usual, the flagellum largely orange ; abdomen cream-colour, with sepia-brown markings, consisting of a brown basal area and (separated only by a fine line, and not reaching the lateral margins) a transverse band on first segment, three spots on second segment, usually two on third, and fine basal lines on second to fourth ; venter pale. Wings and legs as in *P. callicerata*, Ckll.

This might be described as a *P. callicerata*, with the abdomen and lateral face-marks of *P. pallidior*, Ckll. The broad face and the hairiness are entirely as in *P. callicerata*, and readily distinguish it from *P. pallidior* and *P. mentzeliarum*. Is the insect perhaps a hybrid ?

Hab.—Mesilla, New Mexico, at flowers of *Baileya multiradiata*, June 30, 1897 (*Cockerell*). Three females, flying with *P. baileyæ* and *P. callicerata*.

SOME NEW SPECIES OF NORTH AMERICAN GEOMETRIDÆ.

BY JOHN A. GROSSBECK, NEW BRUNSWICK, N. J.

The constant receipt of apparently undescribed species of Geometridæ for determination, makes it desirable that a few be now and then given names. The following species from Southern California and Arizona represent well-marked forms not very easily confounded with anything hitherto described :

Hydriomena densata, new species.—Expanse, 25 mm. Head, thorax and abdomen clothed with mixed brown and grayish scales, the gray ones predominating except on the front and on the palpi, where they are largely brown. The abdomen has also two brown dorsal spots, separated by a whitish spot, on the posterior margin of each segment. Primaries grayish, heavily overlaid with dark brown, the cross-lines composed of the ground colour. Basal line geminate, irregular, the interspace filled in with brown. Intradiscal line geminate, begins on costa one-third out from base, and extends, inwardly scalloped, to inner margin; as a whole, the line curves outward, but the large scallop between the cubital and anal veins gives the appearance of an inward curve. Extradiscal line geminate and much waved; begins on costa one-third in from apex, extends outward to radial vein, then curves inward to cubital vein, and outward again before reaching the inner margin. The space between the intra- and extradiscal lines is dark brown, sometimes with darker wavy lines running through it. Subterminal line wavy, whitish in colour, and runs parallel with outer margin throughout its course. Terminal line broken up into black spots arranged one on each side of the veins. Fringe gray, blackish at the veins. Discal spot black, scarcely to be differentiated from the dark band in which it is situated. Two black dashes are between veins M_1 and M_2 , and M_2 and M_3 , external to the extradiscal line; sometimes these extend beyond the subterminal line, and sometimes the two are more or less fused together, forming a single large spot. Secondaries smoky, the terminal line and fringe as in primaries. Beneath whitish, washed with pale brownish, which, external to the extradiscal line, becomes distinctly brown on both wings, especially at the apex of the primaries. Extradiscal line on both wings present as whitish bands. Discal spots rather small. Spots composing terminal line almost connected. Fringe as on upper surface.

Types: Two males in the collection of Dr. Wm. Barnes and in that of the author.

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Habitat: Baboquivaria Mts., Pima Co., Ariz., and Santa Catalina Mts., Ariz., in September (Barnes).

This species has the general aspect of a *Rheumaptera*, and is rather nearly allied to *Hydriomena basaliata*, Walk., from which it differs principally in the course of the extradiscal line and the smoky hind wings.

Cænocalpe elegans, new species.—Expanse, 29–30 mm. Head brown, with a few whitish scales; front rather yellowish; palpi with mixed white and brown scales. Thorax brown, the central portion and patagia with many white scales. Abdomen cinereous, the posterior edge of the segments dark brown. Primaries whitish-gray, with about seventeen slightly wavy, brown cross-lines running approximately parallel to the outer margin of the wing. The first four of these are more or less fused together, and occupy the whole of the basal area. The following two lines are fine, and have a rather broad margin of ground colour between and on each side of them. The median space has nine lines, the middle one of which is broader and less defined than the others, and represents the median shade; the two bounding lines are darker than those within, and gradually fuse with them, so that in one specimen the lines are scarcely visible at the inner margin, and altogether obliterated at the costa. Following this group of lines are two narrow ones; again bordered on all sides by bands of ground colour; then comes a broad subterminal shade, through which an irregular line of ground colour passes. The terminal line is dark brown, broken at the veins. Fringe grayish, with a brown line running through the centre. Discal spot brown, sometimes surrounded by a ring of ground colour. Secondaries whitish-gray, with four extradiscal lines, most prominent at the inner edge, running parallel to the outer margin of the wing, but turning outward at inner edge. Terminal line and fringe as in primaries. Beneath whitish-gray, finely speckled with brown scales on costal area of primaries and over the whole of the secondaries. One extradiscal line on fore wings and two on hind wings are faintly reflected. Discal spots on all wings.

Types: Female in the author's collection; co-type with Dr. Wm. Barnes.

Habitat: Redington, Arizona (Barnes).

The co-type is by far the handsomest specimen, and I believe is a varietal form of what I take to be the common type described above. In this specimen the lines of the basal and median areas are quite fused together, and the fine lines which just precede and follow the median area are almost absent, leaving broad whitish bands. On the secondaries two of the four lines are lost, and the remaining two are much intensified.

The species is nearest to *C. polygrammaria*, Hulst, but differs in its larger size, darker brown colour, and the comparative evenness of the cross-lines.

Tornos erectarius, new species.—♂. Expanse, 23–24.5 mm. Palpi dark brown, with or without a few yellowish scales; front uniformly dark brown; posterior part of vertex yellowish. Thorax yellowish, more or less mottled with dark brown. Abdomen brown, occasionally with yellow mottlings, and the posterior part of the segments are sometimes whitish. Wings mottled with brown over a gray or ochreous-gray ground. Two rather narrow, blackish lines cross the primaries. The intradiscal line is somewhat obscured in the brown mottlings which overlay the wing; it begins on the costa between the discal spot and the base of the wing, curves broadly outward, and then sweeps inward to inner margin. The extradiscal line begins on the costa, between the discal spot and the apex, slightly nearer the former, curves outward around the discal dot, from which it retains an even distance to vein Cu_2 , then extends far inward to the inner margin; at each of the veins there is a slight thickening to the line. Outward of this line is a band of ochreous, sometimes separated from it by a very narrow line of white. A broken zig-zag subterminal line of white traverses the outer area, and the terminal line is represented by a series of black triangular marks between the veins. Fringes checkered brown and yellowish. Discal spot a large, round tuft of blackish scales. Secondaries with a denticulate, blackish extradiscal line extending continuously from the costa to the middle of the inner margin, and running subparallel to the outer edge of the wing. An intradiscal line is indicated on the inner margin of the wing, but this extends only a short distance into the wing. Subterminal line white, discontinuous and obsolete toward costa. Between this and the extradiscal line is an ochreous shade, but this also disappears before the costa is reached. Fringe as in primaries. Discal spot not large, linear. Beneath light gray, dusted with brown scales, especially on the primaries, and particularly along the costa and near the apex. Extradiscal line vaguely indicated on both wings, and marked rather strongly at the veins by a black spot. Discal spots rather large, dusky.

♀.—Expanse, 26–27.5 mm. Palpi, front and vertex as in male; thorax and abdomen almost entirely ochreous. Ground colour of wings rather even pale ochreous throughout, intensified outward of the extradiscal line. On the primaries there is a sparse scattering of brown scales over the basal and median areas, and a more dense overlaying of similar scales

between the whitish, broken subterminal line and the outer margin from below the apex to the anal angle. Intra- and extradiscal lines and discal spots as in the male, but, on a lighter background, are more prominent and contrasting. Beneath much as in the male, but the dusting of scales is more even.

Types: Two males and three females in the collections of Dr. Wm. Barnes and the author.

Habitat: Santa Catalina Mts., Pinal Co., Ariz., July 24-31, Aug. 1-7, Sept. (Barnes); Baboquivaria Mts., Pima Co., Ariz., July 15-30 (Barnes, Poling).

This species is most nearly allied to *Tornos scolopacinarius*, Gn., but is readily distinguished therefrom by the continuous cross-lines which in *scolopacinarius* are represented by inconspicuous spots, or are absent altogether. The male of *erectarius* is further distinguished from the male of *scolopacinarius* by its peculiar brown mottlings, which in the latter species is a very even chocolate-brown, tending in some cases to ochreous.

Selidosema pulchella, new species.—Expanse, 31-34 mm. Head, thorax, abdomen and ground colour of wings deep flesh colour, the more prominent veins of the latter yellowish-buff. Antennæ, palpi, front (except inferior margin), and two dorsal spots at the apex of each abdominal segment, light brown. Intradiscal, median and extradiscal lines of primaries incomplete, brown, originating on the costa in three equidistant squarish or triangular spots. The first is traceable across the wing as a rather broad, diffuse line curving outward and angled inwardly below the cell. The second is broad, becoming diffuse in the cell, below which it does not extend, except that it is indicated near the fork of the cubital vein by two dots, the dots sometimes meeting at the junction of the fork. The third curves strongly outward and inward, meeting the inner margin a little outward of the middle, and is marked on all the veins by a moderate-sized spot, those on the last median and first cubital veins being connected by an inwardly curved line. From the anal vein to the inner margin there is also an inwardly curved line, and a vague indication that all the spots are connected by a scalloped line is present on one specimen. At the inner margin, and in the middle of the wing just external to the extradiscal line, are diffuse patches of scales. Subterminal line present on the anterior part of the wing as intervenular patches of brown scales. Terminal line brown, outwardly scalloped and marked at the acute angles by a distinct spot; in slightly flown specimens these spots only are present to represent

the terminal line. Discal spot large, ringed, and oval in shape. Secondaries with two distinct cross-lines, between which is located the large discal spot similar to that on the primaries. Intradiscal line obsolete on the costa, and with a deep inward angle at the cubital vein. Extradiscal line inwardly scalloped, bending around the discal spot, below which it sweeps inward, and with an outward angle reaches the middle of the inner margin. At all the angles this line is marked with prominent spots, which extend slightly along the veins. Running parallel to this line externally is a diffuse line best marked at the middle and at the inner margin. Subterminal line showing as patches of scales between the veins except in the central portion, where they are absent. Terminal line as in primaries. Beneath rather even pinkish; the fore wings with a faint wash of pale fuscous, and with a large diffuse subapical spot of the same colour. Large discal spots on both wings almost solid. Extradiscal line showing only at costa. Terminal line indicated by intervenular spots.

Types: Three males in the collections of Dr. Barnes, Rutgers College, and the author.

Habitat: Santa Catalina Mts., Pinal Co., Ariz., Aug. 1-7 (Barnes); Yuma Co., Ariz., March.

Distinguished at once from all described species of the genus by the deep flesh-coloured tint of the body and wings.

(To be continued.)

GALLS FOUND IN THE VICINITY OF TORONTO. — NO. 3.

BY DR. WM. BRODIE, TORONTO.

On Stems of Solidago ceasia.

Aug. 20, 1890, collected two galls from upper third of stems of *Solidago ceasia*; these galls appear like swellings of the stem, cylindrical in form, and in structure resembling the galls of *Gnorimoschema asterella*, on stems of *S. latifolia*, and at the upper ends there were prepared and plugged exits, like the two *Gnorimoschema* galls.

Parasites resembling those from galls of *G. asterella* emerged the following spring.

Sept. 23, 1893, collected five galls from upper third of *S. ceasia* stems; galls spindle-form, 8 x 25 mm. long diameter in axis of stem, and the gall of the same colour; in two of these galls there were open exits, and the producers had emerged. Some of these galls were seen July 16, when they appeared to be mature, but were not collected.

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Sept. 25, 1893, collected on wooded hill in St. James's cemetery, four galls from upper third of *S. ceasia* stems, immediately below flowering panicle, some galls leaf bearing.

The largest of the four was 9 x 27 mm., and this one had a prepared and plugged exit, from which there emerged next day a badly-deformed little moth, suspiciously like *G. asterella*, the only producer from this gall I have seen. Parasites the following spring.

Sept. 18, 1896, collected on wooded hill, north of Toronto, from stems of *S. ceasia* growing where galls of *G. asterella* were common, on stems of *S. latifolia*. These galls had not prepared exits; were parasitized, parasites emerging the following spring. These galls are very rare about Toronto; in structure they resemble galls of *G. asterella*, but are less in size and not so inflated in form, and as I have always found them where galls of *G. asterella* were common, and as the solitary deformed specimen I had somewhat resembled *G. asterella*, there is a suspicion that the *S. ceasia* gall is produced by *G. asterella*. I regret I have not been able to determine this. It is for some other worker to do. However, in my notes I have entered as a provisional name *Pædisca ceasiella*. These four, *Gnorimoschema gallæsolidaginis*, Riley; *G. asterella*, Kell.; *Eucosma Scudderiana*, Clem.; *Stagmotophora ceanothiella*, Cosens; with two doubtful, one on *S. ceasia*, the other on *A. corymbosus*, are the lepidopterous gall producers I have found in the vicinity of Toronto. But there are at least five species of inquiline moths, more or less common, three from *Diplosis* galls and two from *Cynipid* galls.

Stagmotophora ceanothiella, Cosens.—The *Ceanothus* gall.

In the autumn of 1880 I enjoyed holidays in the township of Carden, Victoria County, where I found the shrub, *Ceanothus Americana* (New Jersey Tea) common. I also found the galls common; they appeared to be from a deformed terminal bud, having some resemblance to a gall terminal on twigs of *Rosa blanda*. I collected a number of the galls, kept them outside during the winter, and on May 20, 1881, the gall producers began to emerge, exquisitely beautiful little plume moths, probably the first time human eyes ever looked upon these lovely little gems.

In September, 1887, a collection of galls was made from the tips of stems and branches of *Ceanothus*, some distance east of Toronto; the producers emerged the following spring, May 25, 1888, and two species of parasites a few days later.

Sept., 1890, the galls were on rank growth of *Ceanothus* in the township of Whitchurch; found also at Grimsby and Essex. From this

collection producers and parasites emerged the following season, June, 1891. The galls were all at the top of branches, as if from a deformed terminal bud; rarely overtopped by a growth of stem a little above the gall, with a few leaves.

Collected in Casci ravine, April 23, 1893, and north of Howard Park, May 8, 1893, where the galls were numerous, a large series of specimens. From May 21 to June 27, 1893, numerous producers emerged, and from May 8 to May 29, 1893, two species of small parasites emerged. July 17, 1893, specimens of the moth were sent to Dr. Riley, and of the parasites to Dr. Ashmead.

July 29, 1893, reply from Riley: "Unknown to me"; "Should be described"; and from Ashmead a few days later: "Doubtless new species"; "Will describe."

August 1, 1893, three specimens of mature moth taken while sweeping with hand net in Howard Park.

August 11, 1893, specimens again taken while collecting in Rosedale.

Collected from March 3 to April 10, 1897, at Grimsby, Mount Dennis and Scarboro heights, 57 *Ceanothus* galls. From May 24 to June 12, 1897, numerous producers emerged.

This shrub, *C. Americana*, and the rather peculiar galls very common this year, 1897, on the ridges of King and Whitchurch townships, from Yonge St. to Uxbridge. Mr. Cosens has described the gall, the larva and mature moth in THE CANADIAN ENTOMOLOGIST, Vol. 40, p. 107.

Diplosis punicea.

Cecidomyiid galls are found on leaves and stems of herbaceous plants, on leaves and twigs of shrubs and trees, and deformed buds and flowers. The Cecidomyiid galls are morphologically as destructive as the producers; this may be said of galls generally, so that a description of the gall may be even more specific than a description of the producer as expressive of the biological relations between the "animal and the plant."

From 1887 to 1902 I found these galls common on *Aster puniceus*, one of our fine vigorous flowers which is very common, growing in wet ravines everywhere around Toronto. From 1890 to 1898 I made annual collections of galls in the spring and in the fall. The galls are on branches of the flowering panicle; they are spindle-form swellings of the branches, and in size range from 5 x 10 mm., diameter of stem below gall 2½ to 5 x 15 mm. The galls are one-celled, the larvæ of a pale straw

colour; the producers are of the *Diplosis* type, and very similar to the producers of a similar gall on branches of flowering panicle of *Aster diplopappus*. The following is one of the nine annual entries in my note book: "April 9, 1893, collected in Greenwood and Casci ravines, East of Toronto, a lot of over 50 galls from flowering branches of *Aster puniceus*. Galls spindle-form, 5 x 15 mm., diameter below gall 3 mm; another smaller lot measured 4 x 8 mm., diameter of branch below gall 2½ mm. From May 30 to June 5, 1893, *Diplosis* producers emerged. From June 1 to June 11, 1893, two species of parasites emerged.

"June 11, 1893, specimens of gall producers and parasites mailed to Dr. Riley.

"July 29, 1893, note from Dr. Riley: 'Unknown to me.'"

I have found this gall common in Whitchurch, Owen Sound, Fitzwilliam Island, North Bruce, Grimsby, and no doubt they are more or less common wherever this stately host *Aster* is found.

INDEX OF ORTHOPTERA.

The undersigned has undertaken the task of fully indexing the literature of the Orthoptera of the World subsequent to the year 1900. The task is not a light one, but will, it is hoped, ultimately prove well worth the labour involved. Publication is not contemplated for many years, but in the meantime the index should be of much use in various ways. By the constant use of guide cards indicating reductions to synonymy, or the resurrection therefrom, and the transfer of species from one genus to another, it is hoped to make this more than a mere list of names.

In conjunction with the above undertaking, an exhaustive bibliography has been attempted, and geographical and systematic indexes are kept, listing articles treating of the fauna of different places, and citing tables and important discussions of genera and higher groups.

To facilitate the above work, the writer earnestly requests separates of articles from authors writing on the Orthoptera. The importance of this request is considerable, and its maker hopes that it will be favourably considered by all Orthopterists. The writer will be glad to exchange separates so far as possible, and will be ready at all times to transmit facts and data from the index to any one desiring such information. The index is now complete to date so far as it has been possible to secure the literature.—A. N. CAUDELL, U. S. National Museum, Washington, D. C.

NEW COLEOPTERA FROM THE SOUTH-WEST.—IV.

BY H. C. FALL, PASADENA, CALIF.

The greater number of species made known in this, the fourth paper* of miscellaneous descriptions of Coleoptera from the South-west, are from the Peninsula of Lower California. These descriptions were written some eight or nine years ago, and are based upon material received through Mr. Chas. Fuchs, from the California Academy of Sciences. It was the intention, when sufficient material had been obtained, to publish a third supplement to the "Coleoptera of Baja California," by Dr. Horn, but the source of supply gave out very soon after the receipt of the first installment. One of the species described at that time—*Saxinis Hornii*—was shortly after received from San Diego, Cal., and this name appears in my List of the Coleoptera of Southern California, the description, however, being accidentally omitted. It is high time that this *Nomen nudum* was made good, and it is thought best to present also the description of the other new species written at the same time. The opportunity is taken to add a few other new species collected by Mr. Beyer in the same region, together with two or three more from various sources.

Canthydrus levis, n. sp.—Rather broadly oval, more narrowed behind, colour yellowish-testaceous, elytra darker, upper surface polished throughout. Head impunctate, thorax subimpunctate, except for a line of rather fine punctures along the front margin, and a somewhat numerous group of coarser but feebly impressed punctures irregularly placed in the median basal region. Elytra with intermixed fine and somewhat coarser, feebly impressed punctures, which are slightly better defined in two discal lines bearing fine short hairs. Beneath almost impunctate, except the sternal plates, which are strongly, rather coarsely punctate, each puncture bearing a posteriorly-directed bristle-like hair. The prosternum is broadly rounded anteriorly, and bears at the middle, on either side of the central line, one long and several much shorter spiniform bristles, set subtransversely. The transverse lines of punctures of the abdominal segments are almost wanting.

Length, 2 mm. One example, San Jose del Cabo. Type in the collection of the California Academy.

This species is very easily distinguishable from any previously described from our fauna, and I am unable to identify it with any of the Mexican forms mentioned in Sharp's Monograph.

*The third paper of this series was published in the CAN. ENT., Vol. XXXIX (1907), page 235.

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As compared with our other species, it is decidedly smoother than any, and less elongate than all except possibly *puncticollis*, the form of which I do not now recall. In *bicolor* and *gibbula*, the only other species now before me, there are three or four elongate spiniform bristles on either side of the prosternum in front, in place of the single long and one or two shorter ones in the present species ; perhaps an individual variation.

Scymnus bijugus, n. sp.—Broadly oval, outline nearly continuous, black; head, anterior part of the side margins of the prothorax and two large transverse connected spots on each elytron, yellow ; under surface brownish, legs entirely pale. Upper surface very finely punctulate and moderately shining ; prosternum without elevated lines, sides of mesosternum and abdomen sparsely but more distinctly punctate than the elytra ; metacoxal line incomplete, parallel with the first ventral suture ; abdomen with six segments.

Length, 1.5 mm. One example, San Jose del Cabo. Type in the collection of the California Academy of Sciences.

Belongs to Horn's Group B, and must be associated with *amabilis* and *guttulatus*, from both of which it differs by its more broadly oval form and the elytral markings. The elytral spots are nearly equal in size, and are rather narrowly connected at the middle.

Bostrichus fasciculatus, n. sp.—Blackish-brown, moderately shining. Head closely punctate, front feebly margined at sides. Prothorax as wide as long, front margin sinuate, with two slender unciform processes ; hind angles prominent, dentiform ; entire upper surface strongly though not very densely tuberculate, and clothed thinly with moderately long, recumbent, subinterlacing yellowish-brown hairs, with numerous erect pointed tufts of blackish hairs. Elytra coarsely, deeply, subcristately punctate, without costæ ; vestiture similar to that of the prothorax, the interspersed pointed tufts of blackish hairs longer and very conspicuous.

Length, 7 mm. ; width, 2.4 mm. Santa Rosa, Lower California (Beyer). A most singular insect, totally different in its vestiture from any species previously known to us.

The elytral fasciculæ are approximately as follows : a subsutural series of three prominent tufts, exterior to which are three or four others less regularly placed ; a sutural series of much smaller tufts, and a number of similar ones toward the side margin.

Atenius confertus, n. sp.—Oblong, moderately robust and convex, piceous-brown, surface dull ; beneath red-brown, legs not paler. Head

densely, coarsely punctate throughout, granulate in front; clypeus broadly, feebly emarginate, with a distinct denticle each side the emargination; genæ prominent, the angle scarcely rounded and nearly right. Thorax nearly one-half wider than long, sides broadly arcuate and a little narrowed posteriorly, hind angle obtuse as viewed from above, the sides and base forming a continuous curve when viewed from the side. Surface densely, coarsely punctate throughout, the punctures nearly or quite in contact at all points, basal marginal line entire. Elytra as wide as the thorax, humeri dentate, side a little arcuate, nearly parallel, striæ moderate, distinctly punctulate, intervals moderately convex, the sutural with a single row, the others with two rows of unusually coarse punctures, which are not well defined toward the margin. The punctures occupy about one-third the width of the interval, and are a little closer in the outer than in the inner series of each; those of the inner series being so close to the striæ as to render the inner margin of the interval somewhat crenate. Under surface and legs very coarsely but not very closely punctate; mesosternum not distinctly carinate between the coxæ. Front tibiæ tridentate, feebly crenulate above the upper tooth; hind femora with short marginal line near the knee, hind tibiæ without accessory spinule, the first tarsal joint barely as long as the long spur.

Length, 4.3 mm. One example, San Jose del Cabo. Type in the collection of the California Academy.

This species must stand next to *abditus* by Horn's table, but differs very markedly by the larger, stouter form, and very coarse and dense sculpture. *Abditus* has not yet been reported from the Peninsula, but may reasonably be expected to occur there.

Eburia semipubescentis, n. sp.—Dark brown, head and prothorax nearly glabrous, elytra uniformly but not densely clothed with a single system of very short suberect hairs, beneath sparsely pubescent. Antennæ (♂) longer than the body, basal joint stouter and distinctly sulcate on its anterior face, outer joints very slender, the 11th about one-half longer than the 10th. Prothorax as in *Ulkei*, sides with a moderately prominent subapical tubercle and a median slender acute spine; disk uneven, with sparse, rather coarse but vague punctures. Elytra finely, moderately, closely punctate, each with two small elongate basal and two similar median ivory spots; apex squarely truncate with sutural spine, the outer angle distinct but not prominent.

Length, 19 mm.—Colorado River, California. A single male.

This species is closely allied structurally to *Ulkei*, and should follow it in our lists. In *Ulkei* the upper surface is virtually glabrous throughout, and the elytra are very finely or indistinctly punctate. In *Ulkei*, *stigmatica* and *semipubescent* there is a longitudinally sulcate interocular flattened carina, which is not obvious in the other species of the genus. In the two first-named species this carina is nearly parallel and more deeply grooved; in *semipubescent* it is broader behind and less prominent, with a finer median groove, and is more deeply, transversely impressed behind the antennal tubercles. In *semipubescent* the elytral pubescence consists of a single system of erect hairs, which are almost perfectly uniform in length except for some irregularity near the apex. In all our other species except *Ulkei* (*distincta* is not before me) the elytral vestiture is dual, consisting of recumbent pubescence, with intermixed longer erect hairs.

Metaleptus gracilior, n. sp.—Slender, parallel; red, pronotum with two discal spots, elytra with a small umbonal spot, and the apical third or half black; knees, tibiae and tarsi black. Pubescence rather sparse, fine, short, erect, longer on the disk of the pronotum and the base of the elytra. Antennae (♂) very slender, nearly twice as long as the body; (♀) less slender, not reaching the elytral apex, outer joints shorter, wider and subserrate. Prothorax a little wider than long, sides with a prominent tubercle just behind the middle, disk densely punctate. Elytra slightly wider than the prothorax, and about $2\frac{1}{3}$ times as long as wide, densely but not coarsely punctate, the punctures becoming finer apically, each with two fine but evident subcostiform lines; apices broadly, separately rounded or feebly truncate. Prosternal process strongly convex; metasternum protuberant between the coxae. Legs very slender; the hind thighs sublinear, longer in the male, but passing the elytral apex in both sexes.

Length, $9\frac{3}{4}$ –14 mm.

This species was taken in some numbers in the Baboquivaria Mts. in Southern Arizona by Prof. Snow.

There is some variation in the extent of the black markings; the thoracic spots may unite, the humeral spot is sometimes lacking, the elytral apical area extends farther forward at the suture than at the sides, and in one example unites with the humeral spot, leaving the base narrowly and a portion of the side margin pale.

Gracilior is very distinct from *Batesii*, the latter being a broader insect, the body black throughout except narrow basal and lateral margins

of the elytra ; elytra conjointly rounded at apex, more rugose and without trace of costæ; the lateral thoracic tubercle at the posterior third or fourth; the recumbent pubescence denser and more conspicuous both above and beneath ; prosternum flat, metasternum not at all protuberant between the coxæ ; hind thighs not reaching the elytral apex. In *angulatus* the form is said to be the same as in *Batesii*, the elytra lack the costiform lines, and are sinuously truncate at apex.

In his description of the genus *Metaleptus*, Bates states that the antennæ are 11-jointed, with the terminal joint appendiculate. Horn, however, finds a distinct articulation in the last joint of the male in *Batesii*, and pronounces the male antennæ 12-jointed. In *gracilior* this pseudo-articulation is distinct in some specimens, but almost totally absent in others, and I am convinced that the antennæ are properly described by Bates.

Saxinis Hornii, sp. nov.—Deep blue, feebly shining, head punctulate and slightly rugulose ; thorax moderately, coarsely, rather closely punctate on the disk, more densely at the sides ; elytra densely sculptured, the striæ distinct, but more or less irregular, the punctures of the intervals about equally coarse ; humeral spot confined to the umbone, and involving less than half the epipleural lobe. Beneath finely punctured and densely cinereous pubescent.

Two examples, San Jose del Cabo.

Most closely related to *Sonorensis*, from which it differs in its somewhat coarser sculpture, and very small humeral spot and more parallel form. By Horn's table it would be associated with *saucia* and *politula*, from both of which the denser thoracic punctuation at once separate it. A specimen in my collection from San Diego Co., Cal., differs only in the colour being almost black, and there can scarcely be a doubt that it is identical with the Lower California form.

In Mr. Schæffer's recent table *Hornii* should be inserted just after *Sonorensis*.

Statira colorata, n. sp.—Head, thorax, scutellum and legs rufotestaceous, elytra and abdomen piceous. Antennæ half the length of the body, piceous, basal joints paler, terminal joint (♂) equal to the three preceding. Head finely, rather densely punctulate, feebly shining. Eyes separated on the front by a distance equal to their own width. Prothorax longer than wide, sides broadly arcuate, surface densely, minutely punctulate, rugulose and dull. Elytra finely alutaceous, dull,

striate as usual, interspaces 1, 3 and 5 with respectively 3-4, 7-9, 6-7, setigerous punctures. The seventh and ninth intervals also have each one or two punctures. Tibiæ sulcate on the outer edge.

Length, 7.5 mm. Lower California, San Jose del Cabo.

Described from a single ♂ specimen given me by Mr. Fuchs. I have seen several others from the same source. *Colorata* resembles *subnitida*, the only previously described species from the same region, in its dull surface and sulcate tibiæ, but differs much in colour, in the somewhat more numerous setigerous punctures of the elytra, and in the much less approximate eyes.

Macrobasis excors, n. sp.—Black, densely cinereous pubescent, the tips of the femora, outer edge of front and middle tibiæ and the tarsal joints in great part, black. Antennæ black; first and second joints elongate in the male, the first about reaching the hind margin of the head, but little longer than the second, and a little shorter than the second and third united; second joint fully three times as long as the third and longer than the next two; third about three-fifths as long as the fourth; fourth and following joints linear, about four times as long as wide, slightly decreasing outwardly, both in length and width. In the female the basal joints are much shorter than in the male, the third reaching the back of the head, the second scarcely longer than the fourth. Head less broad posteriorly than in *unicolor*, the tempora less prominent than the eyes. Prothorax longer than wide. Anterior tibiæ with two spurs in both sexes.

Length, 16-17 mm.

Described from a single pair kindly given me by Mr. Beyer, who collected them at El Taste, Lower California.

This species is very similar to *unicolor*, both in structure and general appearance; the latter, however, is smaller, the head a little broader posteriorly than across the eyes, the prothorax as wide as long, and the antennal joints somewhat differently proportioned, the second being relatively shorter as compared with the first, the third scarcely shorter than the fourth, and the outer joints only about twice as long as wide.

Cantharis Blaisdelli, n. sp.—Length, 13-16 mm. Intense black throughout, except for the minute reddish frontal spot, which is often indistinct. Head and prothorax polished and sparsely punctate, elytra finely scabrous and dull. Prothorax about one-tenth wider than long, narrowed behind, sides moderately, strongly rounded at anterior third, nearly straight posteriorly. Tibial spurs slender, subequal.

Male.—Antennæ with joints 5-7 thickened, obovate, evidently longer than wide; 8-10 smaller, mutually similar, slightly elongate, and subequal to, though slightly thicker than, the fourth. Pygidium rounded at apex, the tip feebly subsinuate; last ventral broadly, rather deeply impresso-emarginate, the limiting angles prominent and somewhat deflexed.

Female.—Antennæ shorter, not passing the base of the elytra, gradually incrassate, last ventral not emarginate.

Described from a series of 9 ♂'s and 2 ♀'s, taken at an elevation of 2,750 feet in Siskiyou Co., California, by Dr. F. E. Blaisdell, to whom it gives me pleasure to dedicate the species.

The present species is closely allied to *lugubris*, Ulke (*Ulkei*, Beaugreg), differing in the strongly shining head and thorax, and in the genitalia. In *lugubris* the thorax is relatively smaller, and it and the head are as dull in lustre as the elytra.

Anthonomus tridens, sp. nov.—Short, oblong, rufous, beak in great part, and legs, except anterior thighs, testaceous; vestiture moderately dense, consisting of small elongate scales varying in colour from whitish through ochreous-brown to fuscous. Beak as long as the head and thorax, sparsely pubescent, feebly punctate, striate, tip nearly smooth. Antennæ slender, pale throughout, inserted one-third from the tip, scape nearly reaching the eye, joints all elongate, second equal to the two following, third slightly longer than the fourth. Head coarsely punctate and scaly, front a little concave, somewhat narrower than the width of the beak, eyes prominent, convex. Prothorax scarcely one-half wider than long, sides parallel and broadly rounded in basal half, strongly rounded and moderately constricted in front; apex half as wide as base, surface densely, strongly punctate, with dorsal and infero-lateral vitæ of broader whitish scales, between which the scales are narrower, sparser and ochreous in colour. Elytra nearly one-half wider than the prothorax, sides parallel to apical third, tip conjointly rounded, concealing the pygidium; scales smaller and denser than on the prothorax, generally pale in colour; each elytron with three somewhat broken bands, consisting of spots of fuscous scales more prominent on alternate intervals, the first running inward from the humerus to the suture, the other two converging from the sides so as to enclose that area, which is subdenuded in *signatus* and other allied species; striæ well impressed, intervals moderately convex and feebly tuberculate beneath the dark spots in the basal region. Beneath clothed with yellowish-white scales, abdomen pubescent, second segment longer than the third, which is very slightly longer than the fourth

and subequal to the fifth. Anterior thighs very stout, armed with one long and two shorter acute teeth; middle and posterior thighs unidentate, front tibiae strongly curved; front claws with a long tooth, which is parallel to and nearly as long as the claw; middle and hind claws toothed as usual.

Length, $2\frac{1}{2}$ mm. One example, San Jose del Cabo. Type in the collection of the Cal. Academy.

This species seems most closely allied to *nebulosus*, agreeing with it and with no other so far as I have observed in the ungual peculiarity above mentioned.

I have more recently received several examples of this species from Mr. Beyer, who took it at Santa Rosa and San Felipe, in the Cape region.

Cryptorhynchus lucanus, n. sp.—Oblong, elongate, clothed with rather broad, pale yellowish-brown scales, which are suberect on the head and beak, pronotum, legs and abdomen; recumbent and mixed with erect bristles on the elytra. Beak a little shorter than the prothorax, stout, regularly arcuate. Antennæ inserted near the middle, pale throughout, scape reaching the eye; first and second joints of funicle subequal, the latter more slender and about equal to the two following; club elongate, oval, rather bluntly pointed, the first joint comprising less than one-half its mass. Prothorax a little wider than long, feebly constricted at apex, sides nearly parallel and slightly arcuate in basal half, not carinate; deeply, moderately, punctate, each puncture bearing a suberect scale, which is inclined forward. Elytra parallel to, or a little beyond, the middle, then gradually narrowed, apex obtusely rounded, surface concealed by closely appressed scaly vestiture, which is nearly uniform in colour, except for a common transverse fascia of paler scales at the summit of the declivity, which extends to the fifth interval. Striæ moderate, punctate, each puncture bearing a small recumbent scale, each interval with a row of erect setæ. Under surface with coarse, well separated punctures, each bearing a broad scale. Thighs all with a small acute tooth, tibiae feebly sinuate at intervals, the outer margin not angulate near the knee.

Length, $3-3\frac{1}{2}$ mm. Two examples, San Jose del Cabo. Type in the collection of the California Academy.

In one specimen the scales are as described in colour, in the other much darker brown, rendering the transverse subapical pale fascia much more prominent. Seems most nearly related to *lutosus*, but much smaller, and with decidedly longer and more slender elytral setæ.

Madarellus punctatus, sp. nov.—A little shorter and more robust than *undulatus*, black, polished, beak dark rufous. Head finely, sparsely punctulate above the eyes, front more coarsely and closely punctate. Beak strongly, evenly arcuate, feebly tapering, sparsely, finely punctured at apex, more strongly toward the base. Antennæ inserted near the middle, first joint of funicle about as long as the three following, club equal to the four preceding joints. Prothorax about one-third wider than long, parallel in basal three-fourths, strongly rounded in front and but feebly constricted at apex, coarsely, closely punctate except along the median line behind the middle, punctures becoming confluent laterally. Elytra about one-fourth longer than the prothorax, and very slightly wider at the humeri; sides gradually convergent behind, disk feebly undulated; striæ deep, finely punctate, intervals scarcely more than twice as wide as the striæ, each with a single series of not very fine punctures, separated on an average by about four times their own diameters. Beneath strongly, closely punctate. Femora all armed with a small acute tooth.

Length, 2.8 mm. One example, San Jose del Cabo. Type in the collection of the California Academy.

Very distinct from *undulatus* and *cuneatus* by the coarser, closer sculpture of the upper surface. Each puncture of the thorax and of the elytral interspaces bears a very short, fine, whitish hair.

Cossonus sulcirostris, n. sp.—Moderately convex, piceous, legs rufous. Beak shorter than half the thorax, flattened cylindrical, feebly dilated apically, very finely, sparsely punctate, with a long distinct sulcus extending from the interocular puncture two-thirds the distance to the apex. Scrobes beginning near the tip, not distinctly visible from the front. Head, above the eyes, subimpunctate. Antennæ about as usual, the club nearly uniformly pubescent throughout. Prothorax longer than wide, feebly constricted at apex, a little narrowed at base, sides broadly arcuate, surface very coarsely punctate, closely at sides, more sparsely on the disk, with a nearly smooth area on either side of the middle toward the base, base not distinctly cariniform before the scutellum. Elytra parallel, very slightly wider than the thorax, striæ of coarse punctures, which are separated by about half their longitudinal diameters, intervals nearly flat, very finely, uniseriately punctulate. Beneath coarsely, rather closely punctate, except the abdomen and middle portion of metasternum, where the punctures are finer and sparser.

Length, 4.3 mm. One example, San Jose del Cabo. Type in collection of California Academy.

Resembles *corticola* and *impressifrons* most closely, but may be distinguished from all our described species by the very finely punctate and sulcate beak. The elytral striae, except the sutural, are scarcely at all impressed. The basal joint of the antennal club is usually very sparsely hairy and shining, but is here about as densely clothed as the remainder.

PROFESSOR M. V. SLINGERLAND.

Economic Entomologists throughout North America have experienced a grievous shock owing to the unexpected death of Mark Vernon Slingerland, Assistant Professor of Economic Entomology in Cornell University, which took place at Ithaca, N. Y., on the 10th of March. Carried off in the prime of life by an attack of Bright's disease, his loss is deeply deplored by his associates and students at the University and a wide circle of friends.

From a sympathetic notice by Prof. Comstock in the *Journal of Economic Entomology*, we learn that Mr. Slingerland was born at Otto, N. Y., on October 3, 1864. At the age of 23 he entered Cornell University, and in 1892 received the degree of Bachelor of Science in Agriculture; he was specially commended for proficiency in Entomology during the last two years of his course; in 1899 he was appointed Assistant Professor. He soon became widely known from his contributions to periodical literature (many of his articles appeared in this magazine) and the many Bulletins which he wrote; the publication of his last work, "Insects Injurious to Fruit," has just been announced by MacMillans in their Rural Science Series.

To quote Prof. Comstock: "He was recognized as being one of the foremost workers in economic entomology, and had attained an international reputation. . . . This position was reached by untiring industry and a devotion to truth. His work was characterized by painstaking thoroughness and an absence of anything sensational. His constant aim was to determine the exact and complete truth, and to present what he discovered in a clear manner. In this he was very successful, both in the class-room and as a writer. . . . As a teacher he was clear, direct and painstaking, and he had the keenest interest in the needs of each individual student."

His wife and one daughter survive him; to them we desire to extend our deepest sympathy in their sad bereavement.

C. J. S. B.

BOOK NOTICES.

O. M. REUTER, Bemerkungen über nearktische CAPSIDEN nebst Beschreibung neuer Arten. (Acta Societatis Scientiarum Fennicæ XXXVI, No. 2, 89 pp. in 4:0, Helsingfors, 1909).

This is the most important work thus far published on the numerous North American forms of this exceedingly difficult family of Hemiptera. Since Prof. Reuter published his first paper on Nearctic Capsidæ (1875) the systematization of this family has made considerable progress, and this is almost entirely due to his own work on this family, which he has made his special study for nearly forty years. The author's recent views about the subdivisions of the family are laid down in his "Klassifikation der Capsiden," published a few years ago. In the present paper we find two important improvements on this system. The Division *Garganaria* had been founded on examination of old and ill-preserved specimens, and is now united with the *Capsaria*. On the other hand, the Division *Pilophoraria* has proved to include heterophyletic forms. To this Division the author now refers only *Pilophorus* and a new genus, all other genera being transferred to a new Division, *Cremnocephalaria*, which is placed rather far from the former Division. (The Divisions in which Reuter subdivides the Capsidæ are not systematically equivalent to the subfamilies in other families, and their names ought not to end in *-ini* or *-inæ*, as proposed by Kirkaldy). The systematic place of numerous species chiefly described or named by Uhler has been corrected, little known species are redescribed, and 10 genera and 59 species are described as new. Of great value is the generic key to the 23 nearctic genera of the Division *Capsaria*, four of which are new. A monographic synopsis is given of the genera *Phytocoris*, Fall. (25 species, of which 17 are new); *Lygidea*, Reut. (3 species, 2 new); *Tropidosteptes*, Uhl. (5 species, 4 new); *Camp-tobrochis*, Fieb. (11 species, 4 new); *Cyrtopeltis*, Fieb. (3 species, 2 new), and the new genus, *Euryopiella*, Reut. (4 species, 2 new). The generic synopsis of the *Capsaria* and the descriptions of the new genera and species are in Latin, the other descriptions and remarks mostly in German. As the author lost his eyesight before the manuscript was finished, the descriptions of two genera and ten species have been drawn up by Dr. B. Poppius, under the author's direction and supervision. Of these Reuter and Poppius are to be cited jointly as authors. The printer's errors are, unfortunately, rather numerous, and few of them are corrected. The genus *Caulotops*, Bergr. (previously known only from Argentina), is

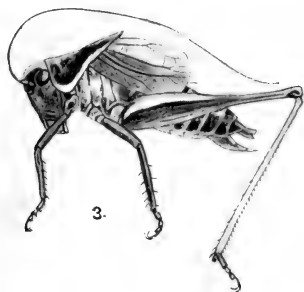
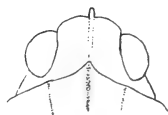
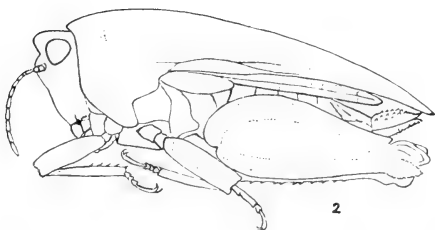
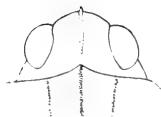
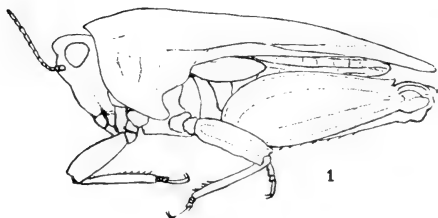
through and through called *Caulatops*. Some incidental remarks may find their place here. The genus *Dacerla*, Sign., is placed in the Division *Myrmecocoraria*, but the author was unable to examine the arolia in the only specimen he has seen. The arolia in *Dacerla* are quite rudimental and fused with the claws, whereas they are large and free in the *Myrmecocoraria*. I think this genus must be placed in the *Cremnocephalaria*. *Horcias affinis*, Reut., is, according to Distant, identical with *limbatellus*, Walk., which has priority. The author states that *Rinacloa citri*, Ashm., is identical with *Hallicus Uhleri*, Giard, but he has overlooked that the specific name *citri* has priority by several years.—E. BERGROTH, Fitchburg, Mass.

FLORIDIAN HEMIPTERA TAKEN BY MR. E. P. VAN DUZEE.

In his "Observations on Some Hemiptera taken in Florida,"* Mr. E. P. Van Duzee has once more rendered a service to American Hemipterists especially, and in a less degree to those of other lands. As the title implies, he has not presented a mere dry-as-dust list, but a very interesting and helpful recital of observations in the field, synonymic notes, rectifications of current misapprehensions, together with a study of the Floridian Hemiptera far more thorough than anything that has been heretofore done for this neglected group and for that region. He enumerates 168 Heteroptera, among them eight new species, and 186 Homoptera, 21 of them new, with two new genera. Mistakes are few, and I have noted only two worthy of being pointed out. *Benacus* and *Amorgius*, by some inadvertence, have been placed in the family "*Nepidae*" (of which, by-the-by, none was taken). The other is mainly a matter of critical interpretation. *Cymus breviceps*, Stal, is listed on p. 166. Mr. Van Duzee, with great kindness, presented me with specimens of this catch. To my eye the insect is not a *Cymus* at all, but belongs in the closely-related genus *Cymodema*, and is possibly *Cymodema exiguum*, Horváth, but, from a cursory examination, I should not be surprised if it turned out to be undescribed. Look again, please, Mr. Van Duzee!

But as a whole, this list merits nothing but praise. It is characterized by this author's well-known desire to be accurate, and is most certainly painstaking and reliable to a high degree. Would that his kind abounded! Then we poor Hemipterists would not be compelled to be forever criticizing, correcting and readjusting.—J. R. DE LA TORRE BUENO, New York.

*1909 Bull. Buff. Soc. Nat. Sci., IX, pp. 149-230.



ORTHOPTERA OF NORTHERN ONTARIO.

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No. 6.

WILLIAM H. EDWARDS.

We regret to record the death, at the ripe old age of eighty-seven years, of this eminent entomologist, which took place at Coalburgh, West Virginia, on the 4th of April. He was an honorary member of the Entomological Society of Ontario, and contributed a large number of papers to this magazine during a long series of years. His son, the Hon. William Seymour Edwards, of Charleston, W. Va., has promised to furnish us with a memoir of his father, which we hope to be able to publish in the July number.

ON THE ORTHOPTERA OF NORTHERN ONTARIO.

BY E. M. WALKER, TORONTO.

(Continued from p. 144.)

1. *Nomotettix borealis*, n. sp. (Pl. 7, fig. 1, 1a.)

Closely allied to *N. cristatus* Harr., from which it differs as follows: Median carina of vertex somewhat less prominent, projecting a shorter distance in advance of the front margin; vertex not projecting quite so far in front of the eyes, the angular excavation beneath it, seen in profile, shallower, the frontal costa gently sinuate. Antennæ (broken off in one specimen) 12-jointed, about one-fourth shorter than in *cristatus*. Median carina of pronotum less regularly arched, highest opposite the fore coxæ, the height thence diminishing somewhat more rapidly and irregularly than in *cristatus*. In the type specimen the mid-carina at its highest point is somewhat higher, in the other, which I have figured, about as high as in typical *cristatus*. Hind femora somewhat narrower and less ampliate at base than in the latter.

Length of body, 8.5 mm.; pronotum, 8 mm.; hind femur, 5-5.6 mm.

Two females, shore of Diamond Lake, Temagami District, Sept. 7, 1908.

Both specimens are of a dark rust-brown colour, the dorsum of the pronotum darker, with a grayish tinge and with two pairs of black spots, the posterior larger and somewhat triangular. A pale yellowish specimen was also seen, but not captured.

The specimen figured was examined by Prof. Morse, who wrote to me that it was new, perhaps a northern variety of *cristatus*. I am inclined to think that this is its proper status, but in any case, it seems worthy of a name.

The shore of Diamond Lake, where these specimens were taken, is a broad sandy beach about 100 yards in length, and the lake for some distance out from the shore very shallow and reedy. The beach is bounded behind by a narrow irregular ridge a few feet in height, which has apparently been pushed up by the ice in winter. This ridge supports a growth of Banksian pine, some of them quite large and spreading, with a very luxuriant undergrowth of Canada blueberries and other shrubs in less abundance. Back of the ridge is a large open sphagnum bog with a dense cover of Ericaceous shrubs, such as Dwarf Cassandra, Andromeda, *Kalmia angustifolia* and blueberry bushes. Between the ridge and the zone of heath shrubs is a strip of nearly dry sandy soil a few feet wide, with scattered blueberry bushes, etc. It was here that these Tettigians, along with one example of *Tetrix acadicus*, were found.

2. *Tetrix granulatus* Kirby.

Fort William, Aug. 27, 1907, 1 ♂, 1 ♀; Temagami, portage between Lakes Obabika and Temagami, Sept. 11, 1908, 1 ♀.

3. *Tetrix Brunneri* Bol.

Near Temagami Falls, Sept. 2, 1908, 1 ♂, macropterous, from a small opening on a portage through a forest of mixed white pine, spruce, balsam, canoe birch, etc. A very few *Melanoplus islandicus* and one *M. femur-rubrum* were the only other Orthoptera found here.

This specimen measures as follows: Length of body, 10 mm.; pronotum, 12.5 mm.; hind femur, 6 mm. It is pale yellowish-brown above, the pronotum marked with two large triangular velvet-black spots, followed by a pair of elongate black streaks.

This species was reported by the writer from Algonquin Park, somewhat doubtfully as *T. acadicus* (36th Ann. Rep. Ent. Soc. Ont., 1905, p. 66). The two Algonquin Park specimens, both males, are similar in size to the Temagami one, and one of them is nearly the same in colour pattern, but in both the pronotal process is much shorter, extending in the single specimen now in the writer's collection, less than 1 mm. beyond the tips of the hind femora, the wings projecting very slightly farther. In the Temagami specimen the pronotal process reaches 4 mm. beyond the hind femora, and the wings .75 mm. farther.

One of the Algonquin Park specimens was sent to Prof. Morse, who verified my determination.

4. *Tetrix acadicus* Scudd.

Fort William, Aug. 27, 1907, 1 ♀, macropterous, taken on the open plateau on Mt. McKay; Diamond Lake, Temagami District, Sept. 7, 1908, 1 ♀, taken on the edge of an open heath bog. (See under No. 1.)

The Fort William specimen is the only strikingly long-winged example I have seen, the pronotal process extending 2 mm. beyond the tips of the hind femora, and the wings about .75 mm. farther. It measures as follows: Length of body, 11 mm.; pronotum, 12.2 mm.; hind femur, 6 mm. In the Temagami specimen the pronotal process reaches only .75 mm. beyond the femora, and the wings the same distance. It measures as follows: Length of body, 9.5 mm.; pronotum, 9.6 mm.; hind femur, 6 mm.

The Fort William specimen is dull yellowish-gray, with no markings, except a few minute dots on the dorsum of the pronotum, a little behind the middle; but the Temagami specimen is brownish-gray, and the black dots are replaced by a pair of velvet-black triangular spots nearly meeting in the middle line and margined externally by a conspicuous yellow line. The inner borders of these spots, the top of the head and four spots on the dorsal surface of the hind femora are bright rust-red.

This species is also known from the Lake of the Woods District, which is the type locality.

The long-winged form, though hitherto unknown, is not, in the writer's opinion, worthy of a name. The use of trinomials for such variations is both cumbersome and misleading. Trinomials should be employed to designate races or subspecies—not mere individual variations, however great these may be. Until comparatively recently the significance of dimorphism in wing-length in the Orthoptera was not understood, and the practice of giving distinctive names to the long- and short-winged forms of the same species was excusable. We are now, however, practically sure that in many, if not all such dimorphic species, both forms must often occur in the same brood, and they are therefore, at most, simply cases of discontinuous variation.

5. *Tetrix Hancocki* Morse.

Summit of Mt. McKay, Aug. 27, 1907, 1 ♀, macropterous.

6. *Chlœaltis abdominalis* Thomas.

Fort William, Aug. 26, 27, 1907; both macropterous and brachypterous forms fairly common, especially upon the plateau and summit of Mt. McKay. Also observed on the grassy plain on the west side of the Kaministiquia River. It was most numerous on the summit of the mountain, where it frequented the small openings in the scrubby woods. It also occurred at Nipigon.

The specimens, like those from the Severn River, Ont., are of larger size than those from the Prairie Provinces and Banff, Alberta.

Measurements: Length of body, ♂ 19 mm., ♀ 23-27 mm.; head + pronotum, ♂ 6.5-7 mm., ♀ 8-8.6 mm.; tegmen, ♂ 11 mm. (brach.), 18-19 mm. (macr.), ♀ 10 mm. (brach.), 21-22 mm. (macr.); hind femur, ♂ 12.5-13 mm., ♀ 13-16 mm.

7. *Chlœaltis conspersa* Harris.

Moderately common at Fort William and Nipigon, but not observed at Temagami. Only a few specimens were collected, and no accurate data can be given as to the relative proportion of macropterous to brachypterous individuals. The latter certainly predominated at Nipigon, where the species was observed in some numbers on logs and rubbish near the edge of a wood in a bushy pasture.

Wing-length is quite variable in the brachypterous type, and it is not improbable that a more or less continuous series of intergrades may be found connecting the latter with the macropterous type. In a typical pair of this form the tegmina of the male measure 17.5 mm., reaching 3 mm. beyond the tips of the hind femora. Those of the female are 19.75 mm. long, likewise extending 3 mm. beyond the hind femora. The wings of such specimens are fully developed and ample, while in the brachypterous type, even in a male with tegmina reaching within 2 mm. of the tips of the hind femora, the wings are quite abortive, being in the latter example 6 mm. shorter than the tegmina.

8. *Stenobothrus curtippennis* Harris.

This species appeared in large numbers in open grassy places at Ft. William and Nipigon, but was not observed at Temagami. It exhibited its usual great variability in wing-length and colour-pattern.

9. *Mecostethus lineatus* Scudder.

Nipigon, Aug. 30, 1907, 1 ♂, 2 ♀ ♀; Temagami, marsh on Obabika Creek, Sept. 11, 1908, 1 ♂. A few others were observed here and at one or two similar places, but could not be captured.

The Nipigon specimens were taken from the open inundated marsh surrounding the island in the Nipigon River. It was not a favourable-looking spot, the swamp vegetation being chiefly *Equisetum*, *Caltha*, coarse sedges, etc., and the specimens taken were the only ones observed, although the ground was gone over thoroughly.

As in specimens from Anticosti, there is a dark brown subbasal ring on the hind tibiæ, very distinct on the inner surface. This ring is absent in the Temagami specimen and generally in specimens from Middle and Southern Ontario, though sometimes indicated in the latter.

The pronotum in the females is somewhat more incrassate, and the fastigium of the vertex tends to be somewhat broader than in specimens from other parts of Ontario.

10. *Mecostethus gracilis* Scudder.

Very common in open grassy places at Fort William and Nipigon, where its presence can be readily detected by its peculiar stridulation. At Lake Simcoe and Go Home Bay, Georgian Bay, this species is strictly confined to open marshes, where it is often found in company with the preceding species; but in the north it enjoys a much wider range of habitat, though still inclined to occupy low grounds. *M. lineatus*, on the other hand, is strictly a marsh form throughout its known range.

Specimens of *M. gracilis* from Lake Simcoe agree perfectly with those from Fort William and Nipigon. Unfortunately no females were found, these being remarkably secretive. At Lake Simcoe great variation in wing-length is met with in the females. The tegmina in one individual in my collection measure 24.5 mm. in length, extending 2 mm. beyond the tips of the hind femora, while in another, only slightly smaller in size, they are only 15 mm. long, and fall 5.5 mm. short of the tips of the hind femora. It would be interesting to know if brachypterism is more marked here than in the north.

11. *Arphia pseudonietana* Thomas.

This insect has been recorded by Caulfield from Nipigon and Sudbury, but I have never met with it in Ontario. It will probably be found in the Rainy River District.

A. frigida Scudd. is also likely to be found there, as it is common from Manitoba to the Rocky Mountains.

12. *Camnula pellucida* Scudd.

Abundant at Fort William and Nipigon, and common in open rocky or sandy places in the Temagami District.

13. *Hippiscus tuberculatus* Pal. de Beauv.

Nipigon (Scudder) ; Sault Ste. Marie (Walker) ; shore of Diamond Lake, Temagami, Sept. 7, 1908, a few nymphs (stad. 3) taken on a dry bushy hillside. This spot was on a rough clearing on which a few trappers' huts stood. Although these were surrounded by a rank growth of grass, weeds and bushes, behind which lay a few acres of recently-tilled land, Orthoptera were by no means abundant, only a few common species, such as *Mel. atlanis*, *femur-rubrum*, *bivittatus* and *Camnula pellucida*, having been observed.

14. *Dissosteira Carolina* Linn.

This species was common on the clearings and roadsides on Bear Island, and was occasionally met with in dry open places on the portages. It was not observed either at Fort William or Nipigon, although it probably occurs at the former locality in limited numbers. I have also recorded it from Kenora (Rat Portage).

15. *Circotettix verruculatus* Kirby.

Generally distributed and abundant on all exposed rocky or otherwise barren surfaces of any considerable area, especially in burnt-over districts. It was very common at the foot of Mt. McKay. In the unburnt or uncleared parts of Temagami it was only occasionally met with, and generally in very small numbers.

The prevailing coloration in these districts is dark grayish-brown, somewhat obscurely mottled. Strongly-marked examples are seldom met with, although this type of coloration seems to be the prevailing one in Quebec and the New England States.

EXPLANATION OF PLATE 7.

Fig. 1. *Nomotettix borealis* n. sp.; 1a, head of same from above.

" 2. " *cristatus* Harr.; 2a, head of same from above.

Fig. 3. *Idionotus brevipes* Caud., brachypterous male ; 3a, same, tegmen of macropterous male.

(To be continued.)

A LAST WORD TO MR. DISTANT.

BY G. W. KIRKALDY, HONOLULU, HAWAII.

In the course of describing a new genus of Gerrididæ (1908, CAN. ENT., XL, 453), it was necessary to compare it with the apparently closely-allied *Chimarrhometra*, Bianchi, the type of which is a species of

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Mr. Distant's. It was necessary, incidentally, to point out that Mr. Distant had endowed it with an extra (fifth!) segment to its labium (*rostrum*), a condition which, if correct, certainly merited more than a passing mention; as a matter of fact, every Hemipterist knows that the labium is always composed of four segments, no more and no less, though sometimes one or more may be difficult to see.

In his reply (CAN. ENT., XLI, 96), Mr. Distant ignores this essential part of my observation, but impeaches my accuracy in a minor detail, although I may remark that if a species is placed in *Halobates*, even with a "?", and is said to be placed provisionally in it, then it *is in it*, at least I do not see where else it can be said to be!

His description of 1879 is reproduced verbatim in his work of 1903 (Faun. Ind. Rhynch. II, 190), yet he did not then recognize immediately the very well marked generic differences between *Halobates* and his new species.

Mr. Distant animadvertes on the seriousness of my work, but what is to be thought of the seriousness of a Hemipterist who mistakes the nymph of a bug for the adult, and creates a new genus on it?¹

I am, I trust, always sufficiently humble under the criticisms of such Masters of Hemipterology as Reuter, Montandon or Horvath, the character of whose works gives them this privilege, while the capital errors of Mr. Distant's work make it impossible to range him among these. For example: *Eumenotes* is a Cimicid (Pentatomid), not (as Bergroth has shown) an Aradid. Mr. Distant has pleaded that he merely followed Bergroth's original disposition.

Curupira is a Myodochid (Lygæid), (and incidentally a synonym); it does not even agree with the characters given by Mr. Distant himself for the family in which he places it.

Rulandus is a Reduviid, not a Nabid. It has not the *faintest* resemblance nor is it structurally allied to any Nabid, except, of course, in so far as it belongs to the same superfamily.

The subfamily Machærotinæ "distinctly links the Membracidæ with the Cercopidæ" (1907 Faun. Ind. Rh., IV, 79), but the resemblance is entirely superficial and not phylogenetic. One has only to examine the form of the face and antennæ in each to recognize the "seriousness" of Mr. Distant's investigations.

1. As for example, "*Buŕceus*" and "*Critobulus*" among the Myodochidæ (Lygæidæ), as well as the numerous Ectrichodiinæ corrected by Reuter and Bergroth.

It is thus with Mr. Distant, not the making of mistakes, as regards the placing in wrong genera, undue lumping or undue splitting of genera and species, or a failure to express in our descriptions the points we see, or think we see (lamentable as these failures are), but a *total ignorance of the fundamental principles governing taxonomy, and a perpetual confusion between Homology and Superficial Resemblance*.

In the Trans. Amer. Ent. Soc. (XXXII, 1906), I published a list of certain Heteropterous genera, with their types, etc. I prefaced this contribution with the following remarks (p. 117): "The object of this list is to enumerate the Heteroptera pagiopoda with their synonyms and type species. . . . It should be considered as a bibliographical contribution." In 1907 (Entom., XI, 2), Mr. Distant wrote: "It seems, therefore, a little surprising that Mr. Kirkaldy should have recently . . . proposed his own classification of the family." In the same publication and year (p. 58) I replied that "I did not, as Mr. Distant affirms, propose a new classification, but distinctly stated . . . that the object of my list was simply to enumerate the genera, genotypes, etc., and that it should be considered as a bibliographical contribution." In the face of these statements, Mr. Distant's repeated allusion to my "connection with a proposed revision of the Capsidæ" is not in harmony with the facts.

Finally, I deny absolutely the slightest interest in persons, but I uphold my right to call attention to any errors or misapprehensions I detect, or think I detect, in the writings of any Hemipterist, in the same way that I welcome criticisms on my own work, provided that they deal with facts, and are not merely invalid reassertions, in another place, after their inaccuracy has been pointed out.⁶

6. Mr. Distant (p. 95) refers to my "misstatements" of his work made in the "Entomologist," and "Ann. Ent. Soc. Belg.," but omits to refer to the fact that I have replied in these journals, showing that my remarks were justified, and were not misstatements. Those who are interested will find both sides set forth in the following papers:

DISTANT: "Entomologist," 1906, pp. 274-5; 1907, pp. 2-3; 1908, pp. 15-6; 36-7; 147-8.

"Ann. Soc. Ent. Belg.," 1907, pp. 220-2.

KIRKALDY: "Entomologist," 1906, pp. 283-7; 1907, pp. 58-60; 61; 282-3; 1908, pp. 12-5; 123-4.

"Ann. Soc. Ent. Belg.," 1907, pp. 123-7; 300-2; 303-9.

In one of these papers Mr. Distant resented my impeachment of his inaccuracy in dates, etc. (1907, Entom., 2). I replied (op. cit., 58), giving several examples. In one of his most recent works (1907 Faun. Ind. Rh., IV, 201) Mr. Distant cites "*Tetigonia*, Geoffr. (Hist. abreg. des Ins., I, p. 429, 1798-99)."

INCISALIA (LEPIDOPTERA) FROM TEXAS.

BY JOHN H. COOK AND FRANK E. WATSON, ALBANY, N. Y.

Some years ago there came into our possession a number of butterflies of the genus *Incisalia*, which we recognized as belonging to an undescribed species, closely allied to *irus*. No data accompanied the specimens, but we have recently learned that the species is found in some abundance near Houston, Texas.

Incisalia hadros,* new species.—Wings above, ♂, brown; ♀, bright ferruginous, with a coppery lustre, slightly clouded near bases, apices and outer margins; fringe concolorous, except for a narrow edging of white near the apex. Wings beneath dark brown, the secondaries with a ruddy cast and a rather obscure overlay of dull griseous scales on the outer margin, broadening toward the anal angle and running up the inner margin about one-third of the way. Practically all the other elements of design (as found in *irus*) may be discerned in some specimens as vaguely lighter and darker markings almost obliterated by the tendency to uniformity in the coloration; but the only remnants visible throughout the series are the extramesial white line on primaries and a white dash occupying the costo-subcostal interspace in the middle of the front margin of the secondaries. In the types (♂ and ♀) and two paratypes (♂ and ♀), which will be sent to the U. S. National Museum, the black spot crowned by a rusty crescent occupying the first median interspace on the secondaries is in evidence. This mark is, however, obliterated in many individuals, especially among the males.

The types were selected to show the more usual form with variegation reduced to a minimum, the paratypes to show a somewhat brighter phase, in which the elements of design are visible, though obscure.

Expanse, ♂, 32 to 36 mm.; ♀, 35 to 38 mm.†

Incisalia Henrici, G. & R., new variety, *solatus*.‡—Differs from the usual northern form in that the difference in colour between the basal and limbal areas of the wings beneath is comparatively slight. The brighter yellows are, in the variety, replaced by yellow-brown, and the blackish-browns are lightened to faded chocolate. The hoary margin of the

*ἄδρός, well-grown.

†The expanse of *irus* varies in the male from 28 to 30 mm., and in the female from 30 to 32 mm. All measurements taken from apex to apex through mesonotum.

‡*Solatus*, sunburnt.

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secondaries beneath is pale and lacking in brilliance, and the wings above show little or no tendency to ferruginous suffusion.

This is an interesting, though by no means striking example of the effects of environment in inducing a protective alteration in colour. The form is a good geographical variety, and merits a distinctive name.

Seventeen specimens from Blanco Co., Texas (Feb. and March).

SOME CURIOUS CALIFORNIAN LEAF-HOPPERS.

BY E. D. BALL, LOGAN, UTAH.

The Jassid fauna of the Western Coast of North America is strikingly different from that of the Mississippi Valley and the Rocky Mountain Region. The *Deltocephalinæ* and *Athysaninæ*, which contained the greater numbers of species in the eastern fauna, are almost wanting on the coast. In place of these groups we find representatives of a number of curious and aberrant genera, some of which are apparently restricted to this region, while others occur in the fauna of Northern Europe. Several of these genera have but a single representative in the European fauna, while in most cases a number of species have been found in the coast region.

Errhomenellus friscanus, n. sp.—Form of *montanus* nearly, but smaller and paler. Female green, male green with black markings. Length, ♀, 5.5 mm.; ♂, 4 mm.

Vertex acutely conically-pointed in the female, shorter and more angular with front in the male, longer than pronotum, ocelli placed closer to the margin than in *montanus*. Front broad, tumid, slightly convex in profile, ledge above antenna but slightly developed. Elytra reaching only to the apex of last dorsal segment in both sexes, exposing the pygofers, their apices rounding, venation faint and weak, under wings about half the length of the elytra.

Colour: Female bright green, slightly whitish pubescent from sparse white hairs; male pale, dirty straw-colour, with a pair of divergent black stripes arising just behind the apex of vertex and extending onto elytra from just outside the scutellum. Elytra smoky-black, with the nervures light. Pale examples have the stripes reduced to three pairs of spots, two pairs on vertex and an elongated pair on pronotum, and in this case the elytra are mostly pale.

Genitalia: Female segment moderately long, rounding posteriorly and weakly notched; male plates long, slender attingent.

Described from eight examples from San Francisco, California, collected by the author. This is a much more fragile species than any before placed in this genus, and in some of its characters resembles an *Euacanthus*.

Errhomenellus aridus, n. sp.—Resembling *maculatus*, but smaller, with the elytra abbreviated in the male. Length, ♂, 4 mm.

Male vertex short, obtusely angulate, the margins slightly convex, scarcely as long as pronotum, over twice longer on middle than against either eye, scarcely as long as its basal width, anterior margin foliaceous against the eyes. Vertex acutely angled with the broad tumid front. Elytra abbreviated, roundly truncate, covering one-half the abdomen, venation obscure, abdomen appressed and upturned posteriorly. Male plates long, strap-shaped, with attingent upturned tips closely folded against pygofers.

Colour: Pale yellow, heavily and irregularly irrorate and reticulate with dark testaceous brown and fuscous, usually a pair of irregular stripes are outlined on scutellum and less definitely on pronotum, and there is always an oblique light dash near the outer angle of the elytron.

Described from four males collected at Reno, Nevada, by the author. Several nearly grown nymphs taken with them were apparently females, and showed about the same head characters as the adult male.

Paropulopa friscana, n. sp.—Form and general appearance of *interrupta* nearly. Over twice as long, with a much shorter vertex. Length, 4.5 mm.

Vertex short, roundly angled in front, three times as wide as its median length, scarcely twice as long on the middle as against either eye. Elytra longer than the abdomen, coriaceous, the costa strongly convex, almost angled in front. Venation distinct, slightly irregular, usually two cross-nervures between the sectors.

Colour: Pale, dirty straw, coarsely irrorate with fuscous, the scutellar carinæ and the posterior tablet are usually light, while the scutellar margins of elytra, the veins of corium, an irregular common black spot on the claval areas, and a few spots on the apical nervures, dark fuscous. Face finely irrorate, a few short arcs and the sutures brown. Femora lined and tipped with fuscous.

Genitalia: Female segment short, almost truncate, slightly roundly excavated on the median third, exposing the base of the pygofers. Male valve very short and broad, almost parallel margined, plates broad,

together almost quadrangular, their apices individually rounding and exposing two stout curved hooks.

Described from eight examples from San Francisco, California. Collected by the author.

Paropulopa arborea, n. sp.—Resembling *Mexicana* in form and colour. Smaller and slenderer than *friscana*. Pale castaneous. Length, 3.5 mm.

Vertex very short, evenly rounding, margins parallel, nearly five times as broad as long. Pronotum convex, elevated behind. Elytra long, slender, the costa only weakly convex, venation distinct, usually two and often three transverse nervures between the sectors, in the latter case there are usually two complete sets of anteapical cells.

Colour pale castaneous, traces of three fuscous points on anterior margin of vertex, the apices of the claval nervures marked with light. Sometimes the apical portion of elytra is faintly mottled with milky.

Genitalia: Female segment short, slightly roundly excavated on the posterior margin, a pair of lateral plates appear beneath in one specimen. Male valve short, transverse, nearly parallel margined, plates long, almost parallel margined, longer than their combined width, their apices individually, roundly pointed.

Described from four examples from Colfax, California. Collected by the author.

Paropulopa Californica, n. sp.—Resembling *interrupta* in size and form, slightly longer and narrower and with more definite dark nervures. Length, 3 mm.

Vertex slightly shorter and more evenly rounding than in *interrupta*, especially in the female. The margin inclined to be thick, as in *Mexicana*. Pronotum not as strongly pitted or as much depressed anteriorly as in *interrupta*. Elytra moderately long and narrow. The costa only slightly curved, venation strong and distinct on apical portion of corium.

Colour: Pale straw, coarsely and irregularly irrorate with fuscous, the nervures on apical portion of elytra almost entirely fuscous, on anterior portion pale or milky.

Genitalia: Female segment long, the lateral margins straight, the posterior margin slightly roundly emarginate from the sharp lateral angles, the middle deeply notched. Male valve short, broad, posterior margin broadly rounding. Plates extremely large, longer than their combined width, their apices together broadly rounding.

Described from eight examples from Salinas, California. Collected by the author. The distinct genitalia of either sex will readily separate this species from the related forms.

Koebelia irrorata, n. sp.—Form of *Californica* nearly, slightly longer and with a longer and more pointed vertex. Head finely irrorate. Length, ♀, 7.5 mm.; ♂, 6 mm.

Vertex as long as its basal width, the lateral margins parallel before the eyes, then rounding evenly to a blunt point. Front narrower above than in *Californica*, the margins straight. Elytra longer and narrower than in that species, not quite covering the ovipositor in the female. Venation obscure, but more regular than in *Californica*. Female segment slightly produced on median third. Male plates triangular, with the apices attenuately produced.

Colour: Vertex, face and pronotum pale buff, finely and evenly irrorate with brown. Elytra powdery-white in fresh specimens, brownish-white in older ones.

Described from three females and three males from Williams, Ariz. Collected by Barber and Schwarz, and received from the U. S. National Museum.

Koebelia coronata, n. sp.—Resembling *irrorata*, but with a still longer vertex. Length, ♀, 7 mm.; ♂, 5 mm.

Vertex rather narrow and angled almost from the eyes to the roundingly pointed apex in the female, parallel beyond the eyes, and then angled in the male. Elytra very short in the female, exposing the last abdominal segment, as well as the long pygofer and ovipositor, as long as the body in the male. Venation weak and obscure. Female segment short, with the posterior margin slightly produced; male plates long, triangular, their apices not produced.

Colour: Female pale ferruginous, male ferruginous-brown. A median line on vertex and pronotum and a crescent just back of the apex of vertex, light, more strongly marked in the male. Face ferruginous-brown, a light line from the eyes along the carinae to the ocelli, then across in about the curve of the vertex margin, except that it is strongly broken forward in the middle.

Described from a single pair from California in the collection of the author.

Koebelia grossa, n. sp.—Resembling *irrorata*, but larger and with a more nearly quadrangular vertex. Length, ♂, 6.5 mm.

Vertex very large, the lateral margins widening before the eyes for more than the length of the eye, then abruptly rounding to the obtusely angulate apex. Front very long and extremely narrow between the antennæ, slightly widening to the ocelli, the disc very flat, and sharply angled with vertex, entire margin back to ocelli thin and foliaceous. Elytra long and coriaceous, slightly exceeding the abdomen; venation obscure, the veins with large, sparse, black tubercles. Male valve semicircular, plates long, triangular, their apices slightly attenuate.

Colour: Vertex and pronotum soiled-white, irregularly irrorate with fine brown points, slightly heavier around the vertex margins. Traces of three orange stripes on vertex and some orange shading on anterior half of pronotum. Elytra pale, very finely and evenly irrorate with brown. The veins faintly milky-white and sparsely ornamented with shining black tubercles. Traces of powdery-white on the disc of corium. Face creamy, heavily irrorate with brown, omitting the usual line on the carinæ.

Described from a single male from Chico, California. Collected by the author.

Macropsis grandis, n. sp.—Form of *bisignata* nearly, much larger, green, the male heavily black marked. Length, ♀, 5.75 mm.; ♂, 5 mm.

Vertex strongly inflated, half longer on the middle than against the eye. Pronotum long, the disc convex and strongly wrinkled. Elytra broad, appressed posteriorly in the male, whole surface covered with fine hair. Venation obscure and rather weak, often a number of reticulate veins between the sectors and along costa.

Colour: Female uniformly light green in life, sometimes with a brownish tinge in old specimens. Male shining black above, except for the narrow lateral margins of the pronotum and the costal third of the elytra before the apical cells, pale green. Below pale green, the black extending down onto the face nearly to the antennal sockets on the side. Some of the males are much lighter, lacking most of the dark on the vertex and pronotum, and often on the apical third of claval areas.

Genitalia: Female segment moderately long, posterior margin truncate, with the median half cut out one-third the depth of the segment, the margins of the cut rectangular; male valve twice the length of the ultimate segment, the margins parallel, considerably exceeded by the long narrow pygofers.

Described from eight examples collected in Colorado and Utah by the author, and two females received from Arizona.

FURTHER NOTES ON THE RHOPALOCERA OF SANTA CLARA COUNTY, CALIFORNIA.

KARL R. COOLIDGE, MONTEREY, MONTEREY COUNTY, CALIF.

The following additions and corrections are supplementary to my list of the diurnal Lepidoptera of this county.* A few notes had been overlooked, and the additions to the skippers have been made through the naming of a small collection by Dr. Skinner. The hysterical state of confusion in the *Hesperidae* makes it quite impossible for a western collector to name his specimens correctly unless he has a large collection and library.

Pieridæ.

Pontia occidentalis, Reakirt.—Mr. A. F. Porter (Entom. News, Oct., '08) records this species from Decorah, Iowa. I have gone over a number of specimens from this locality, and I can hardly see why it should be differentiated from *protodice*, Boisd., which also occurs here. I hope to be able to breed *protodice* this coming season, and ascertain the relationship between the two. The listing of *Zerene eurydice*, Boisd., from Iowa by Mr. Porter is a *lapsus calami*.

Euchloe sara, Boisd.—On page 425 I stated that it was quite probable that *sara* had, besides *Brassica*, another food-plant on which the larva feed in the higher hills, where mustard is not everywhere met with. Late last June, while on a collecting trip in the Santa Cruz Mountains, I found *sara* to be quite common, and after considerable searching I discovered many eggs and young larvæ on *Sisymbrium officinale*, the common hedge mustard, on which I later observed a female ovipositing.

Lycænidæ.

Cyaniris ladon piasus, Boisd.—I find I overlooked the fact that Mr. W. G. Wright, in the CAN. ENTOM., Vol. XX, p. 97, 1888, briefly recorded the life-history of *piasus*, the larva and pupa of which I recently described.† Mr. Wright gives as the food-plant at San Bernardino the flower buds of *Adenostoma fasciculatum* (*Rosaceæ*). Prof. Kellogg, illustrating the chapter on "Colour Patterns and their Uses," in his AMERICAN INSECTS, gives three figures in colour of the larva of *piasus* on its food-plant, *Æsculus Californicus*. The illustrations are given under the title of "*Larvæ of Lycæna sp.*," but in the later edition I find this is changed to "*Larvæ of Lycæna ladon piasus*, Boisd." The following is quoted from the text: "An interesting example of colour harmony, which may be

*CAN. ENT., November, 1908, Vol. XL, p. 425.

†CAN. ENT., October, 1908, Vol. XL, p. 347.

classified under the head of variable protective resemblance, that has come under my observation while writing this chapter, is the case of the larvæ of *Lycæna* sp., abundant on the flower-heads of the just-blossoming (May) California buckeye, *Æsculus Californicus*. The buds of the buckeye are green, or green and rose, or even all rose externally. The quiet slug-like Lycænid larvæ lie longitudinally along the buds and their short stems, and are either green, with faint rosy tinge, especially along the dorsi-meson, or are distinctly rosy all over, depending strictly on the colour-tone of the particular inflorescence serving as a habitat for the larva. The correspondence in shade of colour is strikingly exact; the utter invisibility, or rather indistinguishability, of the larvæ is something that needs to be experienced, as my artists, my students, and I have experienced in the last few weeks, to be fairly realized. We have watched the larvæ through their whole life, and all the time the safe position along the bud and the immobility are maintained." Several other corrections in the *Lepidoptera* have been made in the later edition of AMERICAN INSECTS. On plate XI the figure of *Synchlœ sara*, which was labelled as the eastern *genutia*, has been corrected, and also the figure of *Neophasia Terlootii*, Behr., which was masquerading under the name of *Archonias lyceas*. Will the troubles of *Neophasia Terlootii* ever end? The figures of *Papilio daunus*, Boisd., on page 447, which are figured as *rutulus*, have not been changed.

Hesperidæ.

Pamphila comma juba, Scudder. This large skipper appears to be quite common here, and is also well distributed throughout California.

Thanaos tristis, Boisd.—This species I listed under the name of *clitus*, Edw. What Wright (Butt. West Coast) figures as *tristis* (469) is *juvenalis*, Fabricius, ♂.

Thorybes Mexicana, Herrich-Schæffer.—A single specimen of this species was taken in the foothills on April 26. It is somewhat darker than specimens from the Sierra Nevadas. Wright's figure (No. 472) gives a poor representation of the markings of the primaries.

Hesperia cæspitalis, Boisd.—Finding this species flying abundantly about various flowers in the open spots along San Francisquito Creek last summer, I confined a number of females for ova. Of these but a single ♀ was kind enough to oviposit, and then but a single egg, which proved infertile.

Egg.—Hemispherical, ribbed longitudinally with numerous raised ridges, between which are finer cross-veinlets. Height and diameter about the same. Colour when first laid pale greenish, changing to light lemon-yellow. Diam. 5 mm.

PRACTICAL AND POPULAR ENTOMOLOGY.—No. 27.

THE HEPIALIDÆ, OR GHOST-MOTHS.

BY ALBERT F. WINN, WESTMOUNT, QUE.

The moths forming this family are not at all common in collections, are not strikingly beautiful, and are not particularly injurious to vegetation, but are so utterly unlike their relatives that a few general remarks may be of interest. The Hepialidæ are distributed through all parts of the world, most of the North American and European species being small or medium in size, expanding from a little over an inch to about four inches, the colours being mostly of various shades of browns, grays, yellow and white. In warmer lands, for example Australia and New Zealand, species are found of lovely colours, very large expanse of wings and heavy bodies. The male of one of the commonest European species, *H. humuli*, is of a pure white colour, and this, coupled with its odd habit of hovering in large numbers over the meadows, just at dusk, has caused it to be known as the Ghost-moth, and the family are often spoken of by this name, though also known as Swifts, on account of the rapid flight of some of the smaller species.

The scientific name is derived from the Greek *ἥπιαλος*, which means a shivering fit, a nightmare, a fever attended with violent shivering. Those who have hunted for these moths will appreciate the aptness of the name.

In North America there are a number of species, and in every Province of Canada one or more of them is to be found, but good series of specimens are in few collections, not because the moths are really rare in nature, but because their habits and life-histories are little understood. Unfortunately, also, the literature on the subject is meagre, and the question of which of the species on the lists are really distinct, and which are varieties or synonyms, is a very puzzling one.

The best known species in the East is probably Harris's Silver-spotted Ghost-moth, *H. argenteo-maculatus*, but as I am more familiar with the habits of our local species, *H. thule*, Strk., it will probably be best to select this. The Island of Montreal seems to be the headquarters of this moth, though its habitat extends to Ottawa in a westerly direction, probably north as far as the base of the Laurentian Mountains, but lack of entomologists to the east and south makes it, at present, impossible to limit the range in these directions. It is very regular in appearance,

about July 7th, seldom earlier, in backward seasons perhaps a week later, the flight lasting only about ten days. Having previously found a low-lying field, more or less swampy, with a good growth of scrub willows from four to ten feet high, the food of the larva, we set out after supper, allowing time to get on the ground a little before 8 o'clock. After getting the net and bottles ready, it is well to look over the field, selecting a spot, if possible, from which a good view over the bushes can be obtained, and one that is free from very treacherous or boggy places, as it is often necessary to move about rapidly. Cloudless evenings, with a light west wind, seem to be the most favourable; on cloudy nights the moths begin to fly a few minutes earlier, showing that they wait for a certain degree of darkness.

Five minutes past eight, and there is nothing flying, and nothing to indicate there ever will be, and we begin to get anxious as to whether there will be any sport, our eyes fixed on the air over the willows. The minutes pass—ten minutes past eight—now is the time. A shout comes from one of the party, "Look out, there's one," and flying quickly over the bushes, perhaps ten feet up, is seen a yellowish-white object, a moth expanding a little over three inches, with a long, thin body. There is no mistaking it for anything else, the position and shape of wings in flight is entirely unlike any other moth. We probably miss it as it passes by, but it turns, and comes back a little further in the swamp, suddenly arrests in its long flight, and begins to hover over a certain bush, dancing in the air, backwards and forward, as if it were the ball of a pendulum having a stroke of about two feet. Another moth of the same kind appears, apparently from nowhere, and joins the other in its mad gambol. Another, several more, till perhaps 12 or even 20 are all at it close together in the air. Sometimes they are provokingly just out of reach of the net, at other times it is easy to catch some of them. At the least touch of the net they close their wings and drop either into it or outside. If the former they are easily bottled, as they usually remain quiet for a short time, but it is well to be quick, for when they try to escape from the net the wings vibrate so rapidly that the specimens are ruined by the rubbing against the net. Those that fall to the ground or among the bushes are seldom to be found in the fast disappearing daylight, but they generally fly up again, sometimes to join the remainder of the dancers close by, sometimes to rush off elsewhere. These assemblages usually last only a few minutes;

I have never witnessed them after 8.30 p.m., the moths disappearing as quickly as they came. What do these gatherings mean? Why did they select one spot, hover over it for a while, and then disappear? The revellers were all males; on a willow twig below the swarm was the lady moth, whom they all sought. When a partner was selected, the others went off, perhaps to form other oscillating groups nearby, perhaps to hide till next evening (whether there is a corresponding flight in the morning twilight I know not), perhaps to be eaten up by the bats, which destroy quantities of the moths.

The females are seldom found flying till after the dance of the males is over. Their flight is altogether different, very swift, only a few feet from the ground, and usually in a great sweeping curve. As it is almost dark, it is difficult to make accurate observations on the habits of the females, but this style of flight is probably of importance to the moth in the disposition of her eggs. Most moths lay a comparatively small number of eggs, say 300 or 400, placing them on, or near, the plants on which the larvæ feed, but these Ghost-moths lay at least 2,000, and drop them broadcast as they fly about. There is a regular stream of eggs; it is like the discharge of bullets from a rapid-firing Maxim gun. If a piece of paper be held beneath the moth, when flying, or when held by the wings, the eggs can be heard pattering on the paper as if fine sand were being sifted through the fingers over it. The eggs are exceedingly small for such a large insect, being smaller than those of our tiny blue butterflies.

When laid they are of a dirty white colour, turning black within a few hours. They are quite smooth, and do not adhere to the leaves or grass. One would think that eggs deposited in this haphazard manner would result in a very large percentage of deaths of the baby larvæ through not being able to find the proper food-plant, though possibly almost any tender roots may suffice for their first meals, or till they reached the proper kind.

The quick flight of the moth from one clump of bushes to another may tend to ensure the loss of the least possible number of eggs, and at the same time enable the female to deposit eggs over a much wider area. The larvæ feed on the roots, boring into them, but it seems impossible to breed them in confinement, and it is not yet known whether more than one year is spent in the larval stage.

Let us look at one of the moths which we have just caught, with its beautiful soft lemon-yellow wings, with brown costa, folded over the body

like a slanting roof. Perhaps the first things we notice are the antennæ, mere threads about three-sixteenths of an inch long. Then it is seen that the fore wings and hind wings are almost the same length and shape, reminding us of the dragon-flies. Looking at the under side, we notice the most important character of these moths, the manner in which the wings of each side are fastened together to assure their acting simultaneously. From near the base of the inner margin of the fore wings there projects a lobe, called the *jugum*, or yoke, which passes under the costa of the hind wings. In all other moths, except one small family of very minute species, the wings are connected by a bristle or bristles on the hind wings, or a large angle, extending under the primaries.

The legs of the males have very large tufts of hair, so the sexes can be separated at a glance. The venation is very peculiar, the front and hind wings being almost identical, while other moths have fewer veins in the secondaries, and from this and other characteristics, as well as their universal distribution, some entomologists are inclined to consider them a very ancient type of the Lepidoptera.

To look for the Silver-spotted Ghost-moth, *H. argenteo-maculatus*, instead of selecting a site where there is a growth of willows, we should search for alder bushes. The moths have similar habits, but they fly two or three weeks earlier in the season, and are found over a much larger territory.

Of these moths, the real treasure is the Golden Ghost, *H. auratus*, of which only one example has been recorded from Canada, the Rev. Dr. Fyles having been fortunate enough to take a specimen flying at dusk one July evening in 1865, in Brome Co., Que. The fore wings are decorated with pale brown markings and large patches of dull gold, on a dull lilac or pinkish-fuscous ground colour. The expanse of wings is about two inches. Nothing is known of its habits and life-history, and only a very few stray specimens have been found, but it seems to have a preference for mountain regions, as it has been taken in the Adirondacks, the Catskills, and the White Mountains.

A small species, now and then met with about Ottawa and through the Province of Quebec, but quite common in New Brunswick, Maine and New Hampshire, is called *H. mustelinus*. It expands only about an inch and a half, and is of varying shades of warm browns and grayish-browns, with darker brown bands and spots. The moths seem to frequent the pine

woods, and may often be found towards the end of July, or early in August, in the afternoons, resting on the pine-tree trunks from two to eight feet from the ground, their wings slantingly folded close over the body. At dusk they fly about in openings in the woods with exactly the same hovering flight as the larger species, but later in the evening are often attracted to lights in windows, sometimes in large numbers.

There are a number of other equally interesting species of these moths found in Canada, which space does not permit being even mentioned here, but it is hoped this article will serve to call attention to the group. In order to get accurate information about the distribution and variations of these little-known moths, it is desirable that the capture of any species should be placed on record, with the dates and localities. The writer is anxious to obtain, by exchange, specimens of all the North American species, from as many localities as possible, and will consider it a privilege to examine and return any specimens that may be sent for comparison.

SOME NEW SPECIES OF NORTH AMERICAN GEOMETRIDÆ.

BY JOHN A. GROSSBECK, NEW BRUNSWICK, N. J.

(Continued from page 157.)

Cleora agrestaria, new species.—Expanse, 27–30.5 mm. Head and palpi dark gray; front dark brown. Thorax and abdomen brownish-gray, the segments of the latter edged posteriorly with deep brown. Ground colour of wings whitish-gray, heavily overlaid with brownish-gray. Basal line absent. Intradiscal line blackish, contrasting, edged inwardly by an equally broad border of pale brown, commences on costa one-third out from base, and is directed outward toward centre of wing, but is lost a short distance below costa; begins again near discal spot, and extends slightly outcurved and obliquely inward to inner margin, ending quite close to root of wing. Extradiscal line blackish, faintly toothed outwardly on the veins, and edged externally below M_2 by a broad border of pale brown; begins on costa one-fourth in from apex, and appears only on the veins to M_1 , thence continuous to inner margin, being as a whole slightly outcurved from costa to middle of wing, then extends very obliquely inward, running almost parallel to intradiscal line. Subterminal line whitish, deeply scalloped, runs through centre of broad outer space; internally between M_1 to Cu_2 it is edged with a deep brown shade, and this joins with a subapical dash of the same colour. Terminal line black, scalloped,

well defined. Fringe whitish at base. Discal spot rather small, round, distinct. Secondaries with two median, quite broad, straight lines, extending from inner margin two-thirds across the wing toward costa. The outer one is bordered by a pale brown band. A basal line continuous with the intradiscal line of primaries. Subterminal line whitish, wavy, shaded inwardly with brown, running subparallel to outer margin. Terminal line black, irregularly scalloped. Fringe as in fore wings. Discal spot present. Beneath smoky, costæ with pale brownish cast; extradiscal line of primaries faintly showing; discal spots present.

Types: Male and co-types in the Brooklyn Institute Museum; female and co-types in the author's collection, and co-types with Mr. Geo. H. Field, of San Diego, California.

Habitat: California, Monterey Co. (Doce); San Diego Co., Bat., VI, 30; Thyce Camp, VII, 1; Jacumba, VII, 3; Pine Valley, VII, 5; Talley's, VII, 8 (Field).

In ornamentation the species is nearest to *Hulstina* (*Selidosema*) *formosata*, Hulst, but besides differing in structure is broader-winged, and the two median lines of the hind wings are straight, not parallel to the curved outer margin as in *H. formosata*.

This species was originally included in a paper published in the Jour. N. Y. Ent. Soc., March, 1908, but was excluded at the last moment on the discovery of its similarity to *Selidosema Wrightiaria*, Hulst. I have seen but one of four types of this later species, and while it does not expand 28 mm., it is, I believe, one of the specimens from which the species was described. It is apparently as prevalent in Southern California as *Cleora agrestaria*, and it is possible that one or more specimens of this latter species were included in the description of *Wrightiaria*, hence the measurement, 28 mm.; but whether or not this is the case, I propose to hold Hulst's name on the type that is now in his collection.

Wrightiaria is a smaller species than *agrestaria*, and as here limited is a *Selidosema*. This arrangement does not interfere with the recent result of Mr. Pearsall, by which he refers *Chloroclystis inconspicua*, Hulst, as a synonym of *S. Wrightiaria*, for while *inconspicua* may equal *Wrightiaria*, it certainly is not *agrestaria*.

Cleora fragilaria, new species.—Expanse: ♂, 30–33 mm.; ♀, 37–38 mm. Body and wings in general whitish-gray, the female with an even scattering of brown scales, which gives to it a darker gray colour than

the male. Usually the space between the antennæ is occupied by a brown band, and the superior part of the front is also brownish. Posterior part of collar brownish, and a stripe across the first abdominal segment is of the same colour. Sometimes two dorsal spots are on each of the remaining abdominal segments, though these may be altogether absent. Cross-lines of primaries blackish, narrow; clearly delineated in the male, obscure in the female. Basal line originates on costa one-sixth out, in a black spot, extends outward to cell, then bends inward, and is twice sinuate to inner margin. Extradiscal line begins two-thirds out on costa, extends outwardly sinuate to below R_5 , then curves inward to Cu_1 , is outwardly scalloped between Cu_1 and Cu_2 , again scalloped slightly below this last vein, then deeply incurved to inner margin, terminating between the base of the wing and the anal angle. The median line is rather indistinct, begins on costa between the extra- and intradiscal lines, rounds outwardly the faint discal ringlet, of which it forms a part, and there runs close and subparallel to the extradiscal line to the inner margin. External to the extradiscal line is a brown-ochre shade, broad within the incurves of the extradiscal line, narrow or broken at the outcurves. Outer space with a patch of dark scales between veins R_4 and M_1 . Subterminal line white, scalloped between the veins and running parallel to the outer margin. Terminal line scalloped, and with a distinct black spot at the angles formed by the junction of the scallops. Secondaries with a sinuate intra- and extradiscal line, the former most distinct on inner margin, the latter with the sinuations sometimes angular, and with a distinct outward angle between M_2 and Cu_1 . The latter bordered externally with an ochreous shade. Subterminal line white, scalloped, bordered with a gray shade internally. Terminal line as in primaries, but the scallops much more pronounced. Beneath whitish in male, grayish in female, the primaries dusky subapically and the costa strigate with brown. Discal spots on all wings solid; large and conspicuous on primaries, smaller and faint on secondaries. Terminal line represented by the black points at the angle of the scallops on the upper side.

Types: Ten males and two females in the collection of Mr. Geo. H. Field, of California, and in the collection of the author.

Habitat: San Diego, Cal., June 12, July 17, Aug. 20, 30, Oct. 2, 19, 24, Nov. 2, 15. All taken by Mr. Field. I have the species also from Pasadena, Cal., taken Oct. 10, but these are in rather poor condition, and have not been made types.

The species is very nearly allied to *Cleora emasculatum*, Dyar, but is slighter in build, and the cross-lines, though clearly defined, are narrower and the shades are less conspicuous. Beneath the species lacks the yellowish cast often present in *emasculatum*, and does not show the anterior half of the extradiscal line of the primaries which the latter very pronouncedly does in all my specimens. It is the species referred to occasionally as the western *Selidosema humaria*, and is found in collections under that name.

Stenaspilates levisaria, new species.—Expanse, 30–33 mm. Entire insect pale yellowish-white, more or less profusely sprinkled with fine gray scales. Head and palpi with rather few gray scales; thorax with a very even distribution of the gray scales, while on the abdomen they are clustered into small blotches. Intradiscal line of primaries whitish, scarcely indicated or absent, begins less than one-third out on costa, extends outward toward centre of wing, then curves around and runs evenly inward to inner margin. Extradiscal line whitish, narrow, begins on costa one-third in from apex, and extends, outwardly scalloped between the veins, to the inner margin, the size of the scallops varying with the width of the spaces between the veins. The space from the base of the wing to the intradiscal line is covered with gray and brown scales, rather sparsely at the base, but becoming more dense and more brown outwardly, until at the extradiscal line little of the ground colour is visible except at the costa. Inner half of outer space even pale yellow in colour, or with scattered gray scales; outer half thickly covered with gray scales. Terminal line absent. Discal spot vaguely showing as a grayish spot. A brownish-gray spot in each of the marginal angles of the wing. Secondaries pale at base, becoming darker outwardly, and with a single, slightly scalloped extradiscal line continuous with and similar in colour to the extradiscal line of primaries. Grayish spots in the angles of the wing, and one to four small, defined, black spots near the anal angle. Beneath pale yellowish-white, profusely scattered over with grayish scales. The extradiscal line of both wings appearing as rather even whitish lines.

Types: Two males in the collection of Dr. Barnes and in my own collection.

Habitat: Santa Catalina Mts., Ariz., August 1–7 and September (Barnes).

LIST OF THE SIPHONAPTERA OF CALIFORNIA.

BY M. B. MITZMAIN, B. S., TECHNICAL ASSISTANT, LABORATORY FOR
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The wealth of fauna displayed in the list of mammals from California makes one wonder at the paucity of Siphonaptera recorded from the Golden State. The comparative ease with which specimens can be obtained, and the economic bearing of these parasites in the dissemination of epizootics of obscure origin, furnish an ample incentive for the collection and study of these insects. We are, nevertheless, aware of the repugnance assumed by certain entomologists toward the degenerate flea, and the disrepute in which Siphonapterologists are likely to be esteemed. This contempt, we observe, is not the brand which is bred through familiarity. We venture to surmise, a familiarity with the flea and its behaviour would indeed win many students for research in the Siphonaptera.

We may be presumptuous enough to maintain, that of all insects in California, the flea is probably the most popular; that is to say, it is "the most sought after." Then, too, the hunting season for the flea appears to be open throughout the year, though at some periods it proves a greater "craze" than at others. The present gigantic endeavours of the Surgeons of the U. S. Public Health and Marine Hospital Service in their efficient measures for the suppression of plague in California, are stirring up a popular interest in the flea and its notorious associations. One of the Surgeons in this Service, Dr. Carroll Fox, during the few months engaged in this work has contributed to the California Siphonaptera a greater number of species than any other entomologist.

The bibliographical references pertain only to the records of California workers.

Prior to 1905 the Siphonaptera recorded from California consisted of the following species:

Anomiopsyllus Californicus, Baker.

Ceratophyllus acutus, Baker.

C. proximus, Baker.

C. sexdentatus, Baker.

C. Californicus, Baker.

C. ciliatus, Baker.

The first of these was described in 1904, *Invert. Pacif.*, I, p. 39. The remainder were recorded from California in 1904, *Proc. U. S. N. M.*, XXVII.

June, 1909

In 1907 this list was supplemented by the following species taken from rats :

Pulex irritans, Linn.
Loemopsylla (*Pulex*) *cheopis*, Roth.
Ctenocephalus canis (Curt), Baker.
Ceratophyllus fasciatus, Bosc.
Ctenopsyllus musculi (Duges), Wagner.

These were first recorded as rat fleas in Bull. Cal. State Board of Health, 1907, III, No. 5, p. 39.

The list was augmented in 1908 by the species following :

Argopsylla gallinacea (Westwood), Enderlein.
Hoplopsyllus anomalus, Baker.
Ceratophyllus ignotus, Baker.

These three species were recorded in Entomological News, October, 1908, pp. 380-382.

The remaining species, with a few exceptions, were embodied in a report on the Species of the Siphonaptera found within the boundaries of the city and county of San Francisco, by Fox, Jan., 1909, Entomological News, pp. 10-11.

The following compilation constitutes a compendium of the species of fleas, with normal and occasional or accidental hosts. It may be of interest to note that the fleas recorded from rats had been identified after an examination of more than 200,000 rats of the common varieties found locally and taken from ships in the San Francisco harbour. The squirrel fleas were collected from several hundred California ground squirrels. Two species, *Ceratophyllus acutus* and *Hoplopsyllus anomalus*, seem fairly constant in the San Francisco Bay region and in the vicinity of Los Angeles.

Family RHYNCHOPRIONIDÆ, Baker.

Genus *Argopsylla*, Enderlein.

1.—*Argopsylla gallinacea* (Westwood), Enderlein.

1908.—Mitzmain, Entomological News, XIX, No. 8, p. 381.

Hosts.—Poultry and farm animals, occasionally man.

Region.—Central California.

Family PULICIDÆ.

Subfamily Anomiopsyllinæ, Baker.

Genus Anomiopsyllus, Baker.

2.—*Anomiopsyllus Californicus*, Baker.

1904.—Baker, Invert. Pacifica, I, p. 39.

Host.—Western spotted skunk (*Spilogale phenax*).

Region.—Southern California.

Subfamily Pulicinæ.

Genus Pulex, Linnæus.

3.—*Pulex irritans*, Linn.

1907.—Mitzmain, Bull. Cal. State Board of Health, III, No. 5, p. 39.

Hosts.—Man; domestic fowl, *Gallus domesticus*; brown rat, *Mus Norvegicus*; black rat, *Mus rattus*; dog, *Canis familiaris*; California skunk, *Mephitis occidentalis*.

Region.—Throughout California.

Genus Lœmopsylla, Rothschild.

4.—*Lœmopsylla (Pulex) cheopis*, Roth.

1907.—P. pallidus, Tasch.; Mitzmain, Bull. Cal. State Board of Health, III, No. 5, p. 39.

1908.—Cheopis, Mitzmain, Entomological News, XIX, No. 8, p. 381.

Hosts.—House mouse, *Mus musculus*; brown rat, *Mus Norvegicus*; black rat, *Mus rattus*.

Region.—San Francisco Bay region.

Genus Ctenocephalus, Kolenati.

5.—*Ctenocephalus canis* (Curtis), Baker.

1907.—Mitzmain, Bull. Cal. State Board of Health, III, p. 39.

Hosts.—Dog, *Canis familiaris*; man; brown rat, *Mus Norvegicus*; black rat, *Mus rattus*.

Region.—San Francisco Bay region.

6.—*Ctenocephalus felis*, Bouché.

1909.—Fox, Entomological News, XX, p. 11.

Hosts.—Cat, *Felis domestica*; man; brown rat, *Mus Norvegicus*; California skunk, *Mephitis occidentalis*.

Region.—San Francisco Bay region.

Genus Hoplopsyllus, Baker.

7.—*Hoplopsyllus anomalus*, Baker.

1908.—Mitzmain, Entom. News, XIX, p. 381.

Hosts.—California ground squirrel, *Citellus Beecheyi*; brown rat, *Mus Norvegicus*.

Regions.—Los Angeles and San Francisco Bay region.

8.—*Hoplopsyllus affinis*, Baker.

1909.—Fox. Not published heretofore. To appear in Entomological News.

Host.—Bachman brush hare, *Lepus Bachmani*.

Region.—San Francisco County.

Genus *Ceratophyllus*, Curtis.

9.—*Ceratophyllus acutus*, Baker.

1904.—Baker, Invert. Pacifica, I, p. 40.

Hosts.—*Spermophilus* sp.; California ground squirrel, *Citellus Beecheyi*; nest of wood rat, *Neotoma* sp.

Regions.—Los Angeles, Palo Alto, San Francisco Bay region.

10.—*Ceratophyllus ignotus* (Baker), Wagner.

1908.—Mitzmain, Entom. News, XIX, p. 382.

Hosts.—California pocket gopher, *Thomomys bottae*; California mole, *Scapanus Californicus*.

Region.—San Francisco Bay.

11.—*Ceratophyllus niger*, Fox.

1908.—Fox, Entom. News, XIX, p. 434.

1908.—Mitzmain, erroneously reported as *abantis*, *ibid* p. 382.

Hosts.—Domestic fowl, *Gallus domesticus*; nest of the sparrow, *Passer domesticus*; man; brown rat, *Mus Norvegicus*.

Region.—San Francisco Bay.

12.—*Ceratophyllus proximus*, Baker.

1904.—Proc. U. S. Nat. Mus., XXVII, pp. 412, 446.

Host.—Ground squirrel, *Citellus* sp.

Region.—Southern California.

13.—*Ceratophyllus sexdentatus*, Baker.

1904.—Baker, Proc. U. S. Nat. Mus., XXVII, pp. 403, 446.

Host.—Taken from the nest and from the wood rat, *Neotoma* sp.

Regions.—San Francisco County and Central California.

14.—*Ceratophyllus Californicus*, Baker.

1904.—Baker, Proc. U. S. Nat. Mus., XXVII, pp. 395, 440.

Host.—Field mouse, *Microtus Californicus*.

Region.—Central California.

15.—*Ceratophyllus ciliatus*, Baker.

1904.—Baker, Proc. U. S. Nat. Mus., XXVII, pp. 397, 441.

Host.—Chipmunk, *Eutamias* sp.

Region.—Central California.

16.—*Ceratophyllus fasciatus*, Bosc.

1907.—Mitzmain, Bull. Cal. State Board of Health, III, p. 39.

Hosts.—House mouse, *Mus musculus*; brown rat, *Mus Norvegicus*; black rat, *Mus rattus*; man; California skunk, *Mephitis occidentalis*; California pocket gopher, *Thomomys bottæ*.

17.—*Ceratophyllus Londoniensis*, Roth.

1909.—Fox, Entom. News, XX, p. 11.

Host.—Black rat, *Mus rattus*.

Region.—San Francisco County.

18.—*Ceratophyllus telchinum*, Roth.

1909.—Fox, Entom. News, XX, p. 10.

Host.—Field mouse, *Microtus Californicus*.

Region.—San Francisco County.

19.—*Ceratophyllus multidentatus*, Fox.

1909.—Fox. Unpublished. To appear in early number of Entom. News.

Host.—Field mouse, *Microtus Californicus*.

Region.—San Francisco County.

20.—*Ceratophyllus*, spec. nov., Fox.

1909.—Fox. Unpublished. To appear shortly.

Host.—California weasel, *Putorius xanthogenys*.

Region.—San Francisco County.

21.—*Ceratophyllus Wagneri*, Baker.

1909.—Fox. Heretofore unrecorded.

Host.—Weasel, *Putorius xanthogenys*.

Region.—San Francisco County.

22.—*Ceratophyllus anisus*, Roth.

1909.—Fox. Reported in a private communication; has not appeared in American literature.

Host.—Brown rat, *Mus Norvegicus*.

Region.—San Francisco County.

Genus *Odontopsyllus*, Baker.

23.—*Odontopsyllus*, spec. nov., Fox.

1909.—Fox, Entom. News, XX, p. 11. Recorded as *Charlottensis*.

Rothschild pronounced it a new species.

Hosts.—Field mouse, *Microtus Californicus*; nest of wood rat, *Neotoma* sp.

Region.—San Francisco County.

24.—*Odontopsyllus Wymani*, Fox.

1909.—Fox. To be published in Ent. News.

Host.—California mouse, *Microtus Californicus*.

Region.—San Francisco County.

25.—*Corypsylla ornatus*, Fox.

1909.—Fox, Entom. News, XX, p. 11.

Host.—California mole, *Scapanus Californicus*.

Region.—San Francisco County.

Genus *Spilopsyllus*, Baker.

26.—*Spilopsyllus inæqualis*, Baker.

1909.—P. A. Surgeon Geo. W. McCoy. Hitherto unrecorded.

Host.—Bachman brush hare, *Lepus Bachmani*.

Family CTENOPSYLLIDÆ, Baker.

Genus *Ctenopsyllus*, Kolenati.

27.—*Ctenopsyllus musculi* (Duges), Wagner.

1908.—Mitzmain, Entom. News, XIX, p. 382.

Hosts.—House mouse, *Mus musculus*; black rat, *Mus rattus*; brown rat, *Mus Norvegicus*; field mouse, *Microtus Californicus*.

Region.—San Francisco Bay region.

Family HYSTRICHOPSYLLIDÆ, Baker.

Genus *Hystrichopsylla*, Taschenberg.

28.—*Hystrichopsylla dippei*, Roth.

1909.—Fox, Entom. News, XX, p. 11. Recorded as a new species. Dr.

Fox sent specimens to Mr. Rothschild, who identified them.

Hosts.—California field mouse, *Microtus Californicus*; nest of wood rat, *Neotoma* sp.

Region.—San Francisco County.

29.—*Dolicopsyllus Bluei*, Fox.

1909.—Fox, Ent. News, XX, p. 195.

Host.—California weasel, *Putorius xanthogenys*.

Region.—San Francisco County.

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Including Normal and Temporary or Accidental Parasites.

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<i>Felis domestica</i> —	Ctenocephalus felis, Roth.
<i>Spilogale phenax</i> —	Anomiopsyllus Californicus, Baker.
<i>Mephitis occidentalis</i> —	Ctenocephalus felis, Roth. Pulex irritans, Linn. Ceratophyllus fasciatus, Bosc.
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<i>Scapanus Californicus</i> —	Corypsylla ornatus, Fox. Ceratophyllus ignotus (Baker), Wagner. Ctenopsyllus musculi (Duges), Wagner.
<i>Eutamias sp.</i> —	Ceratophyllus ciliatus, Baker.
<i>Neotoma sp.</i> —	Hystrichopsylla dippiei, Roth. Odontopsyllus sp., Fox. Ceratophyllus sexdentatus, Baker. Ceratophyllus acutus, Baker.
<i>Microtus Californicus</i> —	Ceratophyllus Californicus, Baker. Hystrichopsylla dippiei, Roth. Ctenopsyllus musculi (Duges), Wagner. Odontopsyllus spec., Fox. Ceratophyllus multidentatus, Fox. Ceratophyllus telchinum, Roth.

<i>Mus musculus</i> —	Ctenopsyllus musculi (Duges), Wagner. Loemopsylla cheopis, Roth. Ceratophyllus fasciatus, Bosc.
<i>Mus rattus</i> —	Ctenopsyllus musculi (Duges), Wagner. Loemopsylla cheopis, Roth. Ceratophyllus fasciatus, Bosc. Pulex irritans, Linn. Ctenocephalus canis (Curtis), Baker. Ceratophyllus Londoniensis, Roth.
<i>Mus Norvegicus</i> —	Ceratophyllus fasciatus, Bosc. Loemopsylla cheopis, Roth. Pulex irritans, Linn. Ctenopsyllus musculi (Duges), Wagner. Ctenocephalus canis (Curtis), Baker. Ctenocephalus felis, Roth. Ceratophyllus acutus, Baker. Ceratophyllus niger, Fox. Ceratophyllus anisus, Roth. Hoplopsyllus anomalus, Baker.
<i>Citellus Beecheyi</i> —	Ceratophyllus acutus, Baker. Hoplopsyllus anomalus, Baker.
<i>Citellus sp</i> —	Ceratophyllus proximus, Baker.
<i>Gallus domesticus</i> —	Argopsylla gallinacea (Westw.), End. Pulex irritans, Linn. Ceratophyllus niger, Fox.
<i>Passer domesticus</i> —	Ceratophyllus niger, Fox.

MR. C. T. BRUES, Curator of Invertebrate Zoology in the Public Museum of Milwaukee, has been appointed Instructor in Economic Entomology at Harvard University under Professor Wheeler; after Sept. 1st his address will be Bussey Institution, Forest Hills, Boston, Mass.

CORRIGENDA.

Page 157, lines 11 and 5 from the bottom, and page 158, lines 2, 9, 16 and 21 from the top, for *Solidago ceasia* read *Solidago caesia*.

Page 158, line 18 from the top, for *Pedisca ceasiella* read *Pedisca caesiella*.

Page 159, line 12 from the bottom, for "destructive" read "descriptive."

Mailed June 4th, 1909.

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No. 7.

ON THE ORTHOPTERA OF NORTHERN ONTARIO.

BY E. M. WALKER, TORONTO.

(Continued from p. 178.)

16. *Podisma glacialis Canadensis*, E. M. Walker.

Fort William, Aug. 26, 1907, 1 ♂, 1 ♀; Temagami District: Obabika Portage, Sept. 13, 1908, 1 ♂; Portage, at upper end of Cross Lake, Sept. 3, 1908, 1 ♂; Portage, between Cross and Temagami Lakes, Sept. 4, 1908, 1 ♂.

In the specimen from Cross Lake the hind femora are like those of typical *variegata* in the strongly-fasciate outer surface, otherwise the specimens are typical of the race *Canadensis*, none approaching race *glacialis* very closely.

The female from Fort William was found upon the trunk of a spruce tree beside the road through the spruce swamp, about five feet from the ground. The male was taken in a little opening in the neighbouring woods. The male from the portage between Cross and Temagami Lakes was found adhering to the trunk of a spruce in a damp wood. The other two were taken from bushes at the ends of the portages.

This insect seems to be, on the whole, quite scarce and local. North Bay and certain parts of Algonquin Park are the only places where I have found it in any considerable numbers.

Three specimens of this species were taken by the late Dr. Fletcher at Windy Lake, on the C. P. R., near Sudbury, Ont., Oct. 4, 1907, upon *Comptonia asplenifolia*. They were mentioned in the Entomological Record for 1907 (Ann. Rep. Ent. Soc. Ont., 1907), under the name "*Pezotettix borealis*, Scudd."

17. *Melanoplus Bruneri*, Scudd.

This species was found in great abundance at Nipigon, and also occurred at Ft. William. At Nipigon it far outnumbered all the other *Melanopli* together, and was particularly abundant in a rough bushy clearing on a sandy loam, where it was associated with large numbers of *Camnula pellucida*.

The Nipigon specimens exhibit great range of variation in size, coloration, wing-length and in the development of the depression or notch below the apical margin of the subgenital plate in the male. This depression is not, as described by Scudder, the result of drying, but is present in life, and all gradations exist between individuals in which the apical margin is entire and only a shallow depression beneath it occurs, and those in which the margin itself is as deeply or more deeply notched than in *Mel. atlanis*. The former are typical *Bruneri*, while the latter agree perfectly with Scudder's description and figure of *Mel. Alaskanus*. A considerable series of specimens from Saskatchewan and Alberta exhibit similar variations, but the *Alaskanus* type seems to be everywhere comparatively rare. The reduction of this supposed species to a variety of *Bruneri* also unites two of Scudder's series in the genus *Melanoplus*, viz., the *Utahensis* and the *spretus* series.

As regards wing-length, no definite separation into macropterous and brachypterous forms is possible, but the tegmina show considerable variation in length, in some scarcely reaching beyond the tips of the hind femora, in others surpassing them by fully the length of the fore femora. The majority fall between these extremes. One male from Nipigon is remarkable for its large size and pale ochre-yellow coloration. It measures as follows: Length of body, 25 mm.; pronotum, 5.5 mm.; tegmen, 20; hind femur, 14. The largest female is from Fort William, and has also the longest tegmina, relatively as well as actually. It measures as follows: Length of body, 28 mm.; pronotum, 6 mm.; tegmen, 24 mm.; hind femur, 14 mm.

This species was not met with at Temagami, but has been recorded by the writer from the vicinity of Dwight, near Algonquin Park. They were quite local here, and showed very little variation of any kind.

18. *Melanoplus atlanis*, Riley.

This widely-distributed species was abundant in the fields and pastures on Bear Island, Lake Temagami, and occurred in smaller numbers in most of the clearings in the Temagami District. It was common in fields at Fort William and at the base of Mt. McKay, but the only examples observed at Nipigon were a few taken in a pasture across the river from the village. As it was raining heavily when these specimens were captured, only a few minutes were spent here and nothing else was taken. It is noteworthy, however, that the only *Melanopli* seen here were *atlanis*, while on the other side of the river *Bruneri* was the abundant species, and no *atlanis* were taken.

This species has also been recorded from Sudbury (Scudder), Kenora ("Rat Portage," Walker), Heyden and Searchmont (Williamson).

19. *Melanoplus femur-rubrum*, De Geer.

Common and generally distributed. It was common in fields at Ft. William and on Bear Island, Lake Temagami, and was frequently met with in small numbers in clearings and open swamps in other parts of the Temagami District. It was not observed at Nipigon.

20. *Melanoplus extremus*, Walk.

Fort William and Nipigon, common, the brachypterous form greatly outnumbering the macropterous; Stony Lake, Heyden (Williamson); Algoma, near Lake Kabinakagami (Walker). Elsewhere in Ontario this species is known only from Go Home, Georgian Bay.

21. *Melanoplus angustipennis*, Dodge.

The red legged form (*coccineipes*) is reported by Scudder from Sudbury. Mr. Norman Criddle has sent me both forms from Aweme, Man.

22. *Melanoplus fasciatus*, Walk.

Common in open woods at Fort William and Nipigon; a few taken in the Temagami District.

On Mt. McKay the macropterous form was observed more frequently than the brachypterous. It was common on the summit and on the talus slope. A single macropterous female was taken from the edge of the heath-bog on Diamond Lake, Temagami District.

23. *Melanoplus altitudinum*, Scudd.

Fort William, Aug. 27th, two brachypterous females taken in the open scrubby woods on the top of Mt. McKay; Nipigon, Aug. 28th, one male, brachypterous, taken among the bushes at the edge of a low wood bordering the river; Aug. 30, one female, macropterous, found clinging to a reed in the river, several rods from the shore.

Caudell has pointed out the identity of *Mel. Huroni*, Blatchley, with this species, and having seen the specimens in the U. S. National Museum, including one of Blatchley's specimens, I am perfectly satisfied that his opinion is correct.

Measurements: Length of body, male 21 mm., female 29-32.5 mm.; pronotum, male 5 mm., female 6.5-7 mm.; tegmen, male 10 mm., female 13-14 mm. (brach.), 21 mm. (macr.); hind femur, male 12.5 mm., female 15-16 mm.

In the macropterous female the tegmina surpass the hind femora by about 1.5 mm.

24. *Melanoplus islandicus*, Blatchley.

Fort William ; not uncommon on paths and in openings in the woods, especially at the top of Mt. McKay. I have no specimens from Nipigon, but it was certainly observed there. Temagami : occasionally found in bushy clearings or openings on portages in the woods, always in small numbers.

It has also been taken near Lake Kabinakagami, Algoma (Walker), which is the most northern record for the species.

25. *Melanoplus luridus*, Dodge.

This species was not observed at Fort William, Nipigon nor in the Temagami District, but I have elsewhere recorded the capture of a male from Hawk Lake, near Kenora, Rainy River District, and found it common at North Bay.

Some of the specimens from the latter locality have the tegmina longer than usual.

26. *Melanoplus bivittatus*, Say.

Abundant at Fort William and Nipigon ; moderately common in the Temagami District. All the examples seen were red-legged (*femoratus*), though I have taken a single female of the typical form at North Bay.

At Fort William this species was found to possess longer tegmina and wings than usual, and to be capable of stronger and more sustained flight. Unfortunately, only three specimens were taken, two males and one female, but in all three the tegmina exceed the maximum measurements given by Morse in his "Notes on New England Acridiidae," for New England specimens of this species, these measurements being based on 142 males and 100 females.

Measurements : Length of body, male 26 mm., female 35 mm.; hind femur, male 14.5-15 mm., female 18.25 mm.; tegmen, male 24-24.8 mm., surpassing the hind femora by 5 mm., female 28 mm., surpassing the hind femora by 3.5 mm.

27. *Scudderia pistillata*, Brunner.

Common on bushes in clearings and open swamps. Fort William ; common, especially on the road through the spruce swamps, upon the rank growth of bushes along the roadside. Temagami ; generally distributed in open swamps and heath-bogs, but not numerous. In a large open bog on Diamond Lake, covered almost entirely by Ericaceous shrubs, this was the only species of Orthoptera met with.

Scudderia furcata ranges as far north as North Bay, Lake Nipissing, where I captured a single specimen in September, 1900. This is probably near its northern limit in this part of the country.

28. *Xiphidion fasciatum*, De Geer.

This widely-distributed insect was found in small numbers at Fort William, Nipigon and in the Temagami District.

At Nipigon it was the only Orthopterous insect, except *Mecostethus lineatus*, occurring in the open marsh surrounding the island in the river. Both species were rare, the vegetation being coarse and unsuited to the development of many Orthoptera. At Temagami this species was occasionally met with in long grass growing in sphagnum-bogs.

29. *Idionotus brevipes*, Caudell (Pl. 7, figs. 3, 3a).

Syn. *Platycleis Fletcheri*, Caud.

Four males of this species were taken while stridulating in the open grassy plains east of the river at Fort William. One of these (Pl. 7, fig. 3a) is macropterous, the others brachypterous. Another macropterous male was seen, but not captured. All were taken in rather long grass. I first determined these specimens as *I. brevipes* with some doubt, owing to the statement in Caudell's description of this species, that the lateral carinæ of the pronotum are well developed and somewhat acute. I sent a specimen to Mr. Caudell, who wrote me that it was the male of his *Platycleis Fletcheri*, described in his recent Revision of the N. A. Decticinae from a single female. Shortly afterwards, while at Washington, Mr. Caudell kindly showed me the type of *P. Fletcheri*, and I was satisfied that it belonged to the same species as mine. The close agreement between my specimens and the description of *Idionotus brevipes* was, however, again brought to my notice while making a further study of the insect, so I sent a specimen to Professor Morse, who kindly compared it with the type of *I. brevipes* in the Scudder collection and found them identical. The type specimen is somewhat shrunken from immersion in alcohol, and the lateral carinæ of the pronotum thus appear sharper than they are in life.

Although I have no specimens of the type species of this genus, *I. Brunneus*, Scudd., the descriptions and figures of Scudder and Caudell have led me strongly to the belief that *I. brevipes* is generically distinct from it, probably constituting a new genus. It does not appear to me to be closely related to *Platycleis*, as shown by the much larger and more

ampliate pronotum, and the great development and posterior prolongation of the last dorsal segment of the male, which almost conceals the cerci in a dorsal view. The form of the cerci, too, differs considerably from that which is characteristic of *Platypleis*. Owing to lack of material in this subfamily, I prefer to let the specimens stand for the present in the genus *Idionotus*.

I have also specimens of the brachypterous form from Aweme, Man., collected by Mr. Norman Criddle. It has also been reported from Millarville and Calgary, Alberta, and the type specimen was collected by Kennicott in "Arctic America," so that the known range of the species is from Northwestern Ontario to Western Alberta and northwards into Arctic America.

This species is the only North American Dectician known to be dimorphic in wing-length. Several European species of *Platypleis* also exhibit this feature.

30. *Ceuthophilus pallidipes*, E. M. Walker.

While camping in the woods near Temagami Falls, I found an immature female of this species inside the tent. No other specimens could be found in this district.

31. *Ceuthophilus terrestris*, Scudd.

A female of this species, labelled "Nipigon," was sent to me by the late Dr. Fletcher. I have not met with it in Northern Ontario. Considerable search for *Ceuthophili* was made on Mt. McKay, but without success.

32. *Gryllus Pennsylvanicus*, Burm.

Common on Bear Island and occurring in small numbers in many parts of the Temagami District. Not found at Fort William nor at Nipigon.

I am convinced that this species is not specifically distinct from *G. abbreviatus*, Serv. Every gradation exists between typical examples of both forms. The ovipositor is certainly relatively longer in the larger examples as a general rule, but this distinction is by no means constant, nor does the relative size of the head in the male offer any reliable diagnostic character.

G. Pennsylvanicus seems, in fact, to be a depauperate form of *G. abbreviatus*, having much the same relation to it that *Nemobius fasciatus abortivus*, Caud., bears to typical *N. fasciatus*. The name *Pennsylvanicus* having priority, *abbreviatus* must fall to the rank of a varietal name.

33. *Nemobius fasciatus*, De Geer.

Abundant on Bear Island and occasionally met with elsewhere in the Temagami District. The examples seen were mostly of rather small size. No macropterous individuals were observed.

34. *Nemobius Carolinus*, Scudd.

Under this name I place the species which I described as *N. angusticollis* (CAN. ENT., 36, 1904, p. 186). It is a very variable species, and has apparently been described several times under different names. A few years ago Prof. Morse drew my attention to the probable identity of my *N. angusticollis* with Scudder's *N. Carolinus*, which is not the species usually quoted under that name. Since then I have seen the specimens of *N. Carolinus* in the Scudder collection, and although my examination of these was brief and hurried, I am pretty well satisfied that Professor Morse's suggestion was well-founded. My species, moreover, agrees very well with Scudder's original description (Proc. Bost. Soc. Nat. Hist., 19, March, 1877, p. 36), except in this statement that the ovipositor is longer than in *N. vittatus* (= *N. fasciatus*, De G.), which is an obvious error, as it is contrary to the measurements given in the description itself. At the time I described the species as *angusticollis*, however, I had not considered the possibility of my species being *Carolinus*, on account of its not having been recognized as such by Dr. Scudder himself, and also owing to the fact already mentioned, that the name *Carolinus* has been employed to designate another species altogether.

There are several other names which are apparently synonyms of *N. Carolinus*. The earliest of these is *N. (Anaxipha) septentrionalis*, Scudd. (Nat. Canad., IX, Oct., 1877, p. 292), which is given here to replace *N. exiguus*, Say, under which name a species of *Nemobius* was described by Provancher in his "Petite Faune Entomologique du Canada" (Nat. Canad., VIII, Feb., 1875, p. 61). There can be little doubt that this description applies to the macropterous form of *N. Carolinus*, which I have taken occasionally in Ontario, but does not appear to have been noticed elsewhere. The only point in which the description does not fit *Carolinus* is in the statement, "Appendices abdominaux presque aussi longs que le corps," which may have been an error of observation.

N. affinis, Beutenm., seems to me to be another synonym of *N. Carolinus*, as is probably also the species described by Blatchley as the female of his *N. confusus*. Prof. Morse tells me the male *confusus* is a distinct species.

N. Carolinus is fairly common in Temagami District, its high pitched trill being often heard among the boulders along the rocky shores of the lakes. On densely-wooded islands this species is the only representative of its order, and is confined to the shores. It also frequents low pastures, mossy bogs and other wet places.

A NEW STRATIOMYID FROM TEXAS.

BY D. W. COQUILLET, WASHINGTON, D. C.

Hermetia Hunteri, n. sp.—Male: A robust species with glabrous eyes and tricolorous abdomen (black, brown and yellow), its pubescence short, sparse and inconspicuous. Head yellow, front and face with a median black stripe, that of the front branching below and prolonged upon the face; antennæ and mouth-parts yellow, the last annulus and the lamella of the former black. Thorax yellow, three broad stripes on the mesonotum (the median one not extending behind the suture, the lateral ones throwing off a spur along the suture to the lateral margin), a narrow one on middle of pleura, greatly dilated anteriorly, the breast and middle of metanotum black. Scutellum black, the margin yellow. Abdomen on the first segment yellow, margined with black; the three following segments yellow, the middle of the base narrowly black, which colour is greatly extended toward the lateral margin, without reaching the latter; the black base is followed by a brown spot, which is greatly narrowed posteriorly, and reaches the hind margin of the segment; fifth segment yellow, the narrow base and three stripes issuing from it and nearly crossing the segment, black; of the latter the median stripe is very broad, the lateral ones narrow and extending just inside of the lateral margin. Legs brown. Wings smoky black, a yellowish streak in front of the middle and extending from base of wing to apex of discal cell, stigma a clearer yellow; contact of the discal with the fifth posterior cell unusually short, almost punctiform. Length, 15 mm.

Female: Same as the male, except that the lower half of the front and the face are wholly yellow, the ground colour of the scutellum is brown, and the fifth segment of the abdomen, instead of having the median black stripe, has a much wider brown one, equalling about half the width of the segment. Length, 17 mm.

Hondo and Cotulla, Texas. Four males and three females bred from cactus at the boll-weevil laboratory, in charge of Mr. W. D. Hunter, for whom this fine species is named.

Type No. 12323, U. S. National Museum.

July, 1909

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C. Weld, Farmer's Advocate	Winnipeg, Man.	2 00
W. Ayers	Stockton, Man.	1 00
W. Bond	Ottawa	1 00
Prof. W. E. Britton	New Haven, Conn.	1 00
Miss A. F. Braun	Cincinnati, O.	1 00
A. M. Campbell	Ottawa	1 00
G. P. Clinton	New Haven, Conn.	1 00
A. Cooper	Treesbank, Man.	1 00
C. R. Crosby	Ithaca, N. Y.	1 00
E. H. Dewart	Stockton, Man.	1 00
W. Dewart	" "	1 00
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Prof. L. R. Jones	Burlington, Vt.	1 00
F. D. Jacobs	Winnipeg, Man.	1 00
Miss K. Lee	Clinton, N. Y.	1 00
W. Milne	Ottawa	1 00
Harold V. Morris	"	1 00
G. Michaud	"	1 00
G. F. Matthews	St. John, N. B.	1 00
Miss I. Ritchie	Ottawa	1 00
T. G. Raynor	"	1 00
Miss Ruby M. Rothwell	"	1 00
H. S. Saunders	Toronto	1 00

A. G. Spencer.....	Ottawa.....	\$ 1 00
E. P. Venables.....	Vernon, B. C.....	1 00
C. Vane.....	Treesbank, Man.....	1 00
E. Vane.....	" ".....	1 00

Also a number of smaller subscriptions for amounts less than one dollar. The total amount received to date is a little over \$1,270.00.

ARTHUR GIBSON, Central Experimental Farm, Ottawa, Treasurer.

June 15, 1909.

TWO FOSSIL CHRYSOPIDÆ.

BY T. D. A. COCKERELL, UNIVERSITY OF COLORADO, BOULDER, COLO.

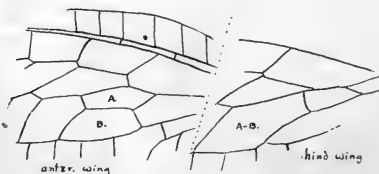
Palæochrysa concinnula, sp. nov. (Fig. 5.)

Length of anterior wing about 12 mm; venation dark brown.

Anterior wing: Costal cells about 14; cells between radius and radial sector 9, the first fully twice as long as the third; cells between radial sector and media 10, successively shorter from the fourth on, but without any abrupt change of size, as in *Tribochrysa*; "third cubital cell" (M_{3+1}) divided longitudinally, as shown in the figure; cells beyond "third cubital" 9, but the cell counted as the tenth of the series above may as well belong to this series, reversing the numbers cited; six veins forked on the lower margin, but the fork of the fifth very small.

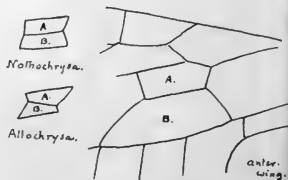
Posterior wing: "Third cubital" not divided; other characters are shown in the figure. (In all the figures A and B are the "third cubital.")

Hab.—Miocene shales of Florissant, Station 14. (*S. A. Rohwer.*)



Palæochrysa concinnula Ckll.

FIG. 5.—*Palæochrysa concinnula*, Ckll.



Palæochrysa ferruginea Ckll.

FIG. 6.—*Palæochrysa ferruginea*, Ckll.

Palæochrysa ferruginea, sp. nov. (Fig. 6.)

Length of anterior wing 11 1/2 mm.; venation as preserved ferruginous, possibly green in life.

July, 1909

Anterior wing: First cell between radius and radial sector not greatly longer than third; cell M_3 (upper division of "third cubital") not extending so far basad as cell M_1 ; at least seven forked veins on lower margin, the first fork very large. The figure shows other important characters.

Hab.—Miocene shales of Florissant, Station 13 B. (*S. A. Rohwer.*)

For comparison, I show the "third cubital" of the allied living genera *Nothochrysa* and *Allochrysa*, the figures copied from Banks. (Trans. Am. Ent. Soc., Vol. XXIX.) It will be seen that *Allochrysa* shows an exaggeration of the condition found in *P. concinnula*; while *P. ferruginea* combines the characters of *Allochrysa* and *Nothochrysa*. In the cells between the radius and radial sector *P. ferruginea* is like *P. stricta*, Scudd., but the latter is considerably larger, and differs in other details.

For other notes on fossil Chrysopidæ, see CANADIAN ENTOMOLOGIST, March, 1908, p. 90.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

MONTREAL BRANCH.

The 36th annual, and 302nd regular, meeting of the Montreal Branch was held at 74 McTavish street, on May 8th, the President, Mr. Geo. A. Moore, in the chair, 12 members being present. The reports of the Council, the Sec.-Treasurer and Curator and Librarian were read and adopted. The retiring President gave an interesting address on the work the Branch is doing, and urged the members to make definite plans as to the filling up of gaps in their collections, or obtaining knowledge of life-histories or habits of certain species with which they are not familiar, and to strive during the summer to obtain the desired results. The Mount Royal Entomological Club was amalgamated with our Society at the beginning of the present year, and the Branch is in a flourishing state, a number of young and enthusiastic members having been recently added to the roll. The election of officers for the ensuing year resulted as follows: President, Henry H. Lyman; Vice-President, G. A. Southee; Sec.-Treasurer, A. F. Winn; Curator and Librarian, L. Gibb; Council, Geo. A. Moore, G. Chagnon, E. C. Barwick, F. Parkins, Jr.

Mr. Lyman read a paper entitled "A Spring Outing," illustrated by specimens of Lepidoptera, and pressed plants collected on a trip to Washington, D. C., about the end of April of last year.

The first field day of the season was arranged to be held at St. Hilaire, Que., on Victoria Day, May 24th.

A. F. WINN, Sec.

CENTRAL EXPERIMENTAL FARM, OTTAWA.

The following appointments have been made to fill the place of the late Dr. Fletcher, the work that he so successfully carried out having been divided: Mr. C. Gordon Hewitt, B.Sc., of Manchester University, has been appointed Entomologist, and Mr. H. T. Gussow, Botanist.

Both of these gentlemen are very highly spoken of, and from the testimonials and other information received by the Commissioners appear to be highly-qualified men. Mr. Hewitt has published some excellent papers on injurious and other insects, illustrated by beautiful plates of his own drawing. He has had considerable experience in dealing with economic questions, and will no doubt soon become familiar with the problems which confront us in this country. Mr. Gussow was brought up in Breslau, studied also in Leipzig, and, in addition, has spent some time in the Pasteur Institute in France. During the last six years he has been assistant to Dr. Carruthers in connection with the Royal Agricultural Society of England. Both these gentlemen will no doubt prove great acquisitions to the scientific staff of the Farm and to the country at large.

We hope that Mr. Arthur Gibson will be retained as assistant. He has had ten years' training under Dr. Fletcher, is now an accomplished economic Entomologist, his specialty being the Lepidoptera, and his knowledge of that order is of great value. There is no doubt plenty of work to be done in these departments by a much larger staff than the Farm has ever possessed.

GEORGE W. PECK.

We regret to record the death of another of our veteran entomologists, in the person of Mr. George W. Peck, of Roselle Park, N. J. He died on the 18th of May, at the age of seventy-two; he was born in Boston, and was a descendant of one of the Mayflower Pilgrims. After being engaged in business in Boston for some years, he removed to New York and became the part owner and head of a wholesale business in glass and tin supplies. His heart, however, was engrossed with nature studies, and he acquired no little reputation in his own neighbourhood as an entomologist and horticulturist. His collection of Lepidoptera is one of the best in New Jersey. He never made any contributions to entomological publications, but, being an enthusiastic collector, he was well known to a great many.

A SUMMER WITH CHRYSOPHANUS DORCAS, KIRBY.

BY WILLIAM W. NEWCOMB, M. D., DETROIT, MICH.

Chrysophanus dorcas is a very interesting little butterfly for several reasons: its boreal origin, in southern Michigan, confined as it is to certain detached islands or areas of decided northern character, wherein its food-plant occurs, its unworked life-history, its supposed rarity and little known distribution, all have made it an attractive field for investigation. It is also worth while to note the confusion which attaches to its identity, two other distinct species, *epixanthe* and *helloides*, having been mistaken for it.

Scattered throughout Southern Michigan, along the borders of streams, in the vicinity of lakes and in other low wet places, are numerous peat bogs, in which the vegetation is of a different type from the surrounding growth. I can here simply call attention to the existence of these northern bog areas in a region of more pronounced southern aspect. Certain boreal insects, among them *Chrysophanus dorcas*, occur in this latitude only in these peculiar bog habitats.*

Oakland county, one of the counties of south-eastern Michigan, is full of little lakes ranging in size from an acre or two to several square miles. It is particularly rich in the number and variety of the bog areas which it contains, and consequently many of the bog plants of the north occur abundantly. Among them there is one, the shrubby cinquefoil (*Dasiphora fruticosa*), with which we are particularly concerned. Doubtless the conditions necessary for the continued existence of this plant in this latitude are unusually favourable in the bogs of this county. Invariably around the pretty yellow flowers of the cinquefoil bushes at the proper time of the year, July, are to be found the little butterflies of *dorcas*.

The particular place where most of the observations upon this insect were made was in the Bloomfield Hills region, about twenty-four miles from Detroit. It was chosen because it was the nearest spot to the city where a goodly amount of the cinquefoil grew, and because of its accessibility. The country about is diversified by low hills and little valleys, and a small stream, a branch of the River Rouge, arising in the lakes to the westward, flows through the locality. There is considerable low, wet ground about the borders of the stream, and within half a mile to the

*See Edgar N. Transeau: The Bogs and Bog Flora of the Huron River Valley: Botanical Gazette, 40: 351-375, 418-448, and 41: 17-42. On the Geographic Distribution and Ecological Relations of the Bog Plant Societies of North America: Bot. Gaz., 36: 401-420.

north a tamarack swamp, the trees of which are mainly small and stunted. At one point close to the little stream, covering an area of less than two acres, the cinquefoil grows very plentifully. A large portion of it is only a foot or two high, but a few clumps reach a height of three or four feet. This particular area is not a pure one, for besides the bog plants present it contains others without northern affinities. Scattered about with the cinquefoil is a good deal of the Ohio golden-rod (*Solidago Ohioensis*) and the white mint (*Koellia Virginiana*). The elevation above sea-level at Bloomfield is 834 feet, the hills in the neighbourhood some thirty odd feet higher.

During the summer of 1908 I determined to find out all I could about *dorcas*, especially to discover the food-plant, and if possible to rear the butterfly through all its stages. Up to this time I had not made any special effort to study it, partly because it was to be found only at some distance from the city. The late Dr. James Fletcher, who had learned of its occurrence near Detroit, and had been "specially interested in this species for several years," corresponded with me regarding it. I shall quote from his letters as his remarks bear upon the subject.

Jan. 13, 1908, he wrote :

"It would be a grand thing if you could secure eggs of *dorcas* during the coming summer, so that we might try to breed the species. Dr. Brodie, of Toronto, assures me that this species feeds on *Hypericum perforatum*, but I cannot help thinking that he is mistaken. With us *epixanthe* flies only in peat bogs. I notice that your specimens of *dorcas* are labelled Bloomfield Hills. Will you please let me know the nature of the locality where you find them. Is it really on the sides of hills or is it in peat bogs near hills? It would be a great triumph if we could secure eggs and breed the species. It is not known what *epixanthe* feeds upon, but I have an idea that every species of *Chrysophanus* will eat Dock."

Again in his letter of July 11, 1908, he wrote :

"With regard to getting eggs of *dorcas*, I would suggest your catching some females after they have passed their prime, and then tying some of these in gauze bags, both over *Hypericum perforatum*, which is alleged to be one of the food-plants, and also over the little Doorweed, *Polygonum aviculare*, upon which *C. helloides* feeds."

On July 9 I found *dorcas* out for the first time of the year at the Bloomfield bog. On the first and the fifth I had visited two other localities without finding any of the butterflies. I think that they were somewhat

delayed in emerging on account of the backward season, and in a more normal year I should look for them a week or ten days earlier. As I approached the cinquefoil area I espied a female, and almost immediately a second one. I then crossed a fence into the main body of the plant, where I found the butterflies out in the largest numbers I have ever seen them. I should think there were hundreds in a space of less than two acres, perhaps even thousands, for they were everywhere flying about and alighting upon the pretty yellow flowers of the *fruticosa*. A few would occasionally stop on some other flower in the vicinity, but the cinquefoil flowers were evidently the favourites. The butterflies were mostly fresh, and many of them looked as if they were just out of the chrysalids. Males greatly predominated, of which I should think there might have been as many as forty to one female. I watched particularly for signs of mating. Early in the afternoon I saw a female with three male attendants, and later on between half-past three and five I saw seven or eight females each with a male near-by, and in two instances found the male flirting his abdomen over to the female, but in no case did I observe any sexual union.

After four p.m. the butterflies began to take up a position on the leaves of the weeds and shrubs other than the cinquefoil, with their wings outstretched flat, the upper surfaces exposed to the sun's rays, their heads as a rule directed away from the rays. As the sun settled lower, the cinquefoil flowers were less frequented, finally became deserted, and more of the butterflies were observed sunning themselves in the manner noted. Later they gradually disappeared, evidently dropping into the thick mat of vegetation, until when I left about half-past six only one or two could be seen. I located a number of females during the late afternoon by discovering that several males would cluster upon the same main upright plant stem (particularly of a species of birch), when upon closer examination a female would be found among them. The males invariably fly upward into the net when it is placed over them, the females on the contrary give a flop, landing lower down in the plant carpet. Later on I gave up the use of the net almost entirely, for I found that the butterflies were so tame that all that was needed was to place the open end of the poison tube down over them as they were seated on the cinquefoil flowers. On the wing one learns to distinguish the sexes readily by the flight alone. The males fly more quickly, hither and thither, with less directness, while the females are slower and take a straighter path. The purple colour of the male, even at several feet away, lets his sex be known.

I made a second trip to Bloomfield on July 11th. Females were now more in evidence, and although in several instances males were about the females, in no case did I observe any pairs in copulation. No hint of egg-laying was obtained.

Thinking that perhaps I might learn something new from other colonies of *dorcas*, on the 15th I visited a spot about one mile beyond the Bloomfield bog. *Dorcas* appeared in good numbers, but as the extent of the cinquefoil was small, the butterflies were less in evidence than in the first location. Females were plentiful, and I observed four pairs in copulation for the first time. I did not succeed in observing a female in the act of egg-laying. About three p.m. some of the males were again seen sunning themselves.

On July 18th I went to Rochester, Mich., walking out to the Parke, Davis & Co. farm on Stony Creek. Here I found the largest area of the *fruticosa* which I have yet run across. The butterflies of *dorcas* were abundant, but the males were all worn, and many of the females, although some of the latter were still bright. Again I could not gather from the actions of any female the secret of where she laid her eggs. There was a very little *Hypericum perforatum* on a hillside above the cinquefoil area, but I never regarded this seriously as a food-plant, for I knew where it grew abundantly within nine miles of the city, without any hint that *dorcas* lived in the neighbourhood.

Dasiphora fruticosa has always seemed to me to be the most probable food-plant, for as long as I have known this butterfly (at least twenty years), I invariably found it flying in its vicinity. Accordingly, on my next visit, on July 21st, to the Bloomfield bog, I confined three females over the cinquefoil, and also some over two other plants abundant there, three females over white mint, and two over Ohio golden-rod. I observed no *H. perforatum*, *P. aviculare* nor any dock growing near the *fruticosa*. I brought home six live female butterflies, placing them in a box near a window, with fresh stems of the cinquefoil flowers and leaves. On this trip the males that were flying were all worn, and in less numbers than the females, which were still plentiful. In the middle of the afternoon the males were again observed sunning themselves, and the habit of clustering of both sexes, as previously explained, was also noted.

On July 24th I found eight eggs on the sprays of cinquefoil in the box with the six female butterflies. On the previous morning I had looked, but could find none. On the 30th I found three more eggs, and the last of these butterflies had died.

The butterflies confined on the plants at the Bloomfield bog were examined on the 25th. They were all dead, and not a trace of an egg could be found on the white mint or the golden-rod, but when I looked over the cinquefoil I was rewarded by finding fifty-four eggs. It now seemed certain that the *fruticosa* was the right food-plant, and I became convinced of it when I found nine more eggs by searching on the growing plant. When I returned home ten additional eggs were discovered on some cinquefoil which had been gathered in the bog.

I now found no trouble to get eggs abundantly, both from females confined in the open and at home. In the latter case conditions were always made as attractive as possible for the butterflies; fresh flowers and leaves, with the stems kept in water, were provided in a large, light, airy box. In this way, from fourteen females confined at the same time I obtained two hundred and fifty-one eggs, an average of eighteen to each female, lacking one. A single butterfly confined alone in the same way, but in a large glass jar, laid twenty-four eggs, which, with seven eggs dissected from the abdomen after her death, gave a total of thirty-one eggs, the largest number obtained from any single female. From ten females confined in the open I secured one hundred and sixteen eggs, an average of eleven and one-half eggs, with one egg over. Of course some eggs were undoubtedly deposited before the butterflies had been taken, so that I am inclined to think that the average number laid by a single female is not far from thirty.

I quote from Dr. Fletcher's letter of Aug. 6, 1908 :

"I don't know which I am shouting loudest, thanks to you for sending me the precious eggs of *dorcas* or congratulations for having found the food-plant. I must say I am surprised at this. As a piece of collateral evidence that you are right in the food-plant, Dr. Brodie reported, you remember, that he found the larvæ on *Hypericum perforatum*, or rather perhaps a plant which I may have understood him to mean for *Hypericum perforatum*. Now, there is a sufficient resemblance between that plant and *Potentilla fruticosa*, when described superficially, for his plant to have been that species, and where he found his eggs there is little doubt that the *Potentilla* grows. I am very much surprised that it should have been a *Potentilla*, but from your finding the eggs on the plant in the open, there is little doubt that you are right. . . . I think it just possible that these eggs will not hatch until spring. This is the case with *thoe*, sometimes at any rate. . . . It will be well for you to leave some of the eggs on the plants out of doors, where they were laid, and watch

them in the field to see if any hatch this autumn. On one occasion when I had eggs of *thoe*, several of them hatched in the autumn, and it was from these that I got the insect through all its stages, the first time I bred it."

Again from his letter of Aug. 19th :

"Your success in getting these eggs is certainly remarkable. . . . I think probably that these eggs will follow the same course as those of *gorgon*. I remember once having from Mr. W. H. Edwards larvæ to hibernate for him of *C. Snowi*, which passed the winter as half-grown larvæ. . . . It would be very interesting if you could find eggs of *dorcas* in the open, and then mark the plant and watch them to see what they do under natural conditions."

At the Bloomfield bog, on July 30th, there were a few worn males flying, and while females were more abundant, it was evident that *dorcas* was near the end of its flight for the season. On this date ten females were confined in the open. At my next visit, on August 22nd, a rough count through the gauze bag gave me seventy-four eggs, which were left for future developments. A search on the growing cinquefoil yielded seventeen eggs, all of which except one (accidentally removed) were left on the plants. These were marked with strings, or in the case of three eggs on the same plant covered with gauze. On October 15th I visited the locality again; the three eggs under the gauze were found on the dried leaves where the latter had fallen, and were as bright as any eggs when first laid. Two of the eggs on the plants marked with strings were also found, while no eggs at all could be located on some of the others. As the eggs are usually laid on the leaves, in the last case they had probably fallen with them to the ground. The bag in which the ten females had been confined was still in place, but on November 15th I found that it had been removed. It was lying, however, not far off, and contained only forty-two eggs. At no time had I discovered any larvæ, and none of the eggs brought home had hatched. In a single instance I had found what looked like the base of an egg attached to a dead leaf, as if the larvæ had eaten the rest of the egg, but there was not enough of the egg to make this certain. From all the data at hand then, I concluded that *dorcas* passed the winter in the egg state, and that if any eggs hatched in the summer or fall it was a very small proportion, as yet undetermined.

The female butterfly under natural conditions lays her eggs near the top of the cinquefoil bush. Usually it is on the pinnate leaf, within four inches of the tip of the branch. In forty-one examinations only four eggs were lower than this, the lowest being eight inches. Most of the eggs in

the open were found on the smaller bushes. The egg is almost always placed on the under surface of the leaflet. Out of sixty-three eggs only two were placed on the calyx, and of the other sixty-one, fifty-five, or over ninety per cent., were between the centre of the leaflet and the tip, the remainder being between the base and the centre of the leaflet. In confinement the butterfly lays her eggs on the leaves, sepals and petals, upper or lower surfaces, indiscriminately, but even here the larger number of the eggs will be located on the under surfaces of the leaflets.

An enemy of *dorcas* was discovered in a lemon-yellow spider. Several times I caught a spider with one of the butterflies in its grasp. In this connection I observed a peculiar thing: sitting on one of the yellow flowers was a small pale-coloured spider, probably the same as the lemon-coloured one. A butterfly was approaching the flower, when suddenly within about a foot and a half he gave a quick jerk, turning in another direction as if he had seen the menace to his safety in the waiting spider. His leisurely approach, abrupt turn and startled flight were at least suggestive. Once I found an egg with a circular puncture, but outside of the spider no enemy has yet been detected.

There are two or three further observations of interest. It was found that the butterflies when seated on the flowers usually held their wings upright or nearly so in the case of the males, and horizontally in the females. After a few visits with the butterflies I became able to distinguish the females when on the wing, even at some distance, not from the character of the flight, but from the shade of colour of the under side of the wings. This side is more in evidence when the insect is flying, and the feature presenting the difference of the sexes was the uniformity of the bright colour of the under side in the female. In the males there is a faint purplish tint on this surface on the hind wings and on the tips of the fore wings, lacking or feebly expressed in the females.

A peculiar disparity in the lengths of the antennæ occurred in four butterflies taken at the same place on the same day. The normal length of the antenna in the male is between 6.5 and 7 mm., in the female about 0.5 mm. shorter. In the male specimen taken the left antenna was of normal length, while the right measured 5.5 mm. In two females the left antenna was normal in each, the right 4 mm. long in one, 4.5 mm. in the other. In the fourth specimen, a female, both antennæ were short, the left 4 mm., the right 5 mm. long.

When Michigan becomes better known entomologically, *dorcas* will undoubtedly be found over a large portion of it, both north and south, for

its food-plant is common through most of the State. In south-eastern Michigan I know it so far only from Oakland County, although it probably occurs in the adjacent counties, but less frequently on account of the smaller number of bog areas. Dr. Wolcott* mentions *C. epixanthe* from Lambertson Lake, in western Michigan. As it was spoken of as flying over shrubby cinquefoil, I have little doubt but that the butterfly was *dorcas*.

The home of this species is in British North America, and it has been found in southern Labrador in the east, Sitka and Kodiak (Alaska) in the west, and in the Nahanni Mountains on the Mackenzie River (Lat. 62°), the most northerly point. It is known also from localities in between and as far south as Colorado, and colonies probably exist in many of our western cordilleras. Its most southerly limit may possibly be in Arizona, for *Potentilla fruticosa* has been recorded from the San Francisco Mountains in that State.

Regarding the validity of *dorcas* as a true species, I can best quote the emphatic words of Dr. Fletcher, to whom I sent specimens.

He wrote in his letter of Jan. 13, 1908 :

"I have no doubt at all that this is true *dorcas*, an insect which I have found very rare in collections. It is quite different from *epixanthe*. . . . I think you will see the differences at a glance. *Epixanthe* is of a duller gray, always pale beneath instead of ruddy fulvous, and regularly slightly smaller than *dorcas*. The males of *dorcas* always show more spots above, and have much less of the submarginal band at anal angle of secondaries above. The red markings of this submarginal band beneath are less angular than in *dorcas*. The two chief characteristics by which *dorcas* can be separated from *epixanthe* are the larger size and the much richer ruddy hue beneath."

In his letter of Feb. 22, 1908 :

"It is funny to me how few people really understand this species, which they mix up with *heloïdes* and *epixanthe*."

Again Aug. 6, 1908 :

"Few of our American entomologists believe in *dorcas* as a species, some thinking it to be merely *heloïdes*, and others *epixanthe*."

When one has these three species before him there is little doubt of the distinctness of each. The fact that the food-plants of all three are now known, and that they are different in each case, is of course significant.

*Robt. H. Wolcott: Butterflies of Grand Rapids, Mich., CAN. ENT., Vol. XXV, p. 103.

Florus is a variety of the female of *dorcas*. It occurs in Oakland county, but is much less frequent than the usual form of the female. Wm. H. Edwards, in describing *florus*, says: "Upper side dark brown, a little mottled with obscure yellow on disk of primaries at end of cell and outside the black spots in median interspaces only." I find this yellow existing as a mere trace in the first median interspace to a patch of yellow outside of every black spot in the transverse row of spots on the outer third of the wings, excepting the first spot next the costa on the fore wings and the first two spots on the hind wings. The yellow at the end of the cell in my series is less frequent than the yellow outside the row of black spots. *Dorcas* males vary little, this being chiefly in the width of the black border on the upper surfaces of the wings.

I wish to express my appreciation of the deep interest which the late Dr. Fletcher took in my observations upon this species. It is with the greatest regret that I realize I am to receive no more of his instructive and enthusiastic letters. As for the full history of *dorcas*, I am trusting that the eggs will hatch, and that the larvæ may be raised to maturity.

NEW GEOMETRIDS OF THE GENUS *HYDRIOMENA*.

BY L. W. SWETT, BOSTON, MASS.

Hydriomena Barnesata, n. sp.—Expanse, 29–35 mm.; *palpi* very long, 2 mm., and beak-like, black-scaled, white-tipped, front of head gray, thorax and abdomen light gray. Fore wings ash colour, with greenish shading basally and near border of wing; hind wings smoke coloured. The fore wings have indication of a band close to body, then an ash-coloured space about 2 mm. wide from basal band, then a black band running straight from costa to inner margin, as in most of the *Hydriomenas*, a greenish space, then another black band same as first, only slightly wider and more irregular in course, with a tendency to bend outward on median vein, then a greenish space and a third line running straight across same as others, only much narrower after it leaves the costa, where it starts from a large spot. These three dark, wide bands form a mesial band as it were, then from this mesial band of three straight bands is an irregular, quite wide, pale, more or less mottled space, edged externally by an irregular, narrow black line which runs from costa, where it starts from black patch running to vein 3, where it is broken, thence to inner margin. Between this and outer margin is another black line, broad near costa, and tapering as it reaches inner margin; near apex of wing a black dash, which runs to this irregular line, as is the case in most of the

Hydriomenas ; beyond this line is a clear outer margin with dots at the ends of the veins at base of fringe, which is quite long and brownish, with a line running through. Hind wings brownish, showing traces of two irregular dark lines, pale between, fringe whitish, with intervenular dots. Tip of abdomen tufted, as are all the Hydriomenas. Beneath, fore wings pale ash-gray, showing faintly the lines above, the two near outer border being plainest, and the apical streak. Hind wings same colour as fore wings, with only one of the black lines showing, that being the inner one, which makes quite a dip. This species can be readily distinguished by the long palpi and straight mesial bands, which are peculiar for this group. I take pleasure in naming this geometer after Dr. Barnes, who has done so much to increase our knowledge of the western species.

Types, 3 ♂'s, two from Dr. Barnes, Huachuca Mts., Ariz., and one from Mr. Grossbeck, Arizona, and in their collections.

Hydriomena Cochiseata, n. sp.—Expanse, 31-33 mm.; *palpi* short, about 1 mm. in length, brownish, white-tipped ; wings full and rounded, more like *Mesoleuca* ; front of head whitish ; thorax and abdomen gray. Fore wings dark gray, with a reddish tinge in one specimen. Basal band smoke-coloured, then a light space ; median space made up of the usual three bands, the first basally irregular and bent outwards, particularly on median vein, thence to inner margin in two scallops ; the second band is hardly distinguishable, but is broad and irregular, as the median band has no clear space between the lines, but is suffused with smoke-colour ; the outer band is also very irregular, starting from a black patch on costa, whence it runs to inner margin, meeting middle line and fusing with it to form a Y, as in *furcata* = *sordidata* of Europe ; in some cases the mesial space is narrow and irregular, being not over 4 mm. at widest part, which is rather striking in this group ; this band is in one example white, and in the second suffused with gray ; the outer line bordering mesial space starts very irregularly near costa in a series of notches, and is quite wide till 4 mm. below costa, then it is an irregular black hair line to inner margin. From this line to outer margin both specimens are suffused with dark gray ; a second irregular line is scarcely visible near outer border, there being a reddish shading on either side. Marginal dots and moderately long brown fringe. Hind wings brown, with two characteristic pale lines. Beneath, pale gray on fore wings, with the white mesial space showing plainly and black outer line. Hind wings same colour as fore wings, and with inner line showing.

Types, 2 ♂'s, Palmerlee, Cochise Co, Arizona, from Mr. Broadwell's collection.

Hydriomena Glenwoodata, n. sp.—Expanse, 25 mm; *palpi* rather long and slender, blackish; front of head grayish; thorax and abdomen gray. Fore wings light ash-gray, with slightly greenish tinge of a more or less mottled appearance. Line at base of wing hardly discernible, first line of the mesial band bent outwards very strongly between median vein and costa, below it runs almost straight from vein to inner margin; second line fairly wide, rather irregular in course, appearing in three blotches on costa, median vein and inner margin; outer line, starts outward from costa, and then in a peculiar S-like curve, which in one specimen is rather broad to inner margin, where it forms a black patch, a characteristic marking of a good many of this group. The mesial space is pale and rather suffused with dark gray, discal spots easily distinguished, linear. Line bordering mesial space externally starts as black patch on costa, then a fine line discernible as dots on veins to inner margin. Marginal band irregular and smoke-coloured, rather broad, exterior margin clear, except for dots at end of veins at base of fringe. Apical streak appears as a spot; fringe light ash and short. Hind wings dark ash, two pale outer lines hardly visible, discal dot, unless looked for especially, is so minute as to escape detection. Beneath the fore wings are quite a dark smoke colour, with the linear discal dot showing faintly. The submarginal line shows quite plainly from costa to median vein, and is shaded lighter externally, the general course being a low curve. Hind wings lighter than fore wings, discal spot hardly visible, faint outer line showing. The long slender palpi and the peculiar double curve of the outer line of mesial band will serve to distinguish it from *autumnalis* or other forms.

Types, 1 ♂, July 16-23, Glenwood Springs, Colo, 1 ♀, Aug. 1-7, Glenwood Springs, Colo., 1 ♀, Colo. (Bruce). All from Dr. Barnes. One ♀, Half-Way House, Pike's Peak, Colo., 9,000 feet altitude, July 16-18, 1902, from H. H. Newcomb, in my collection.

Hydriomena Chiricahuata, n. sp.—Expanse, 25-28 mm.; *palpi* moderate, 1 mm. in length; front of head dark gray, same colour as palpi. Fore wings rather long and pointed, of a reddish ash colour in the mesial space and greenish on mesial band and outer margin (basal band, if any, does not show); first line curved outward from costa to inner margin; second line hardly visible, narrow and rather zigzag in its course; third line of mesial band bends quite sharply inward from costa almost to

mesial vein, then bends sharply outward to vein 3, then inward to vein 2, then outward to inner margin, where it ends in a large black blotch. Mesial space light ash with reddish shading, discal spot small, black and linear. The mesial band is narrower than any of the other species, not more than 3 mm. in widest portion. Outer black line of mesial space bends sharply outward from costa to vein 7, then sharply inward towards discal point, sending a black streak almost to it, from which it doubles back towards outer margin in two scallops to vein 3, whence it runs almost straight to inner margin, ending in a black spot. The usual smoke-coloured irregular band between this line and outer margin, beyond which the wing is clear, except for intervenular spots, also the usual black apical streak; fringe short and light ash-coloured. Hind wings pale ash, discal spots showing plainly. The inner characteristic line of this group showing in dots on veins which is rather unusual, the outer pale line being normal. Beneath, fore wings pale ash, and showing same markings as above, except that the extradiscal line shows quite plainly at costa as a black patch, discal points visible on fore and hind wings. Hind wings light ash, inner band showing in dots on vein as above.

Types, 2 ♂'s, Huachuca and Chiricahua Mts., Arizona, from Dr. Barnes.

This species may be known by the peculiar narrow mesial band, the course of third line, and three black patches on inner margin and by the dotted line on hind wing.

Hydriomena Edenata, n. sp.—Expanse, 30–34 mm.; *palpi* long, 2 mm., rather bushy, black scaled; front of head yellowish-ash; thorax and abdomen light ash. Antennæ minutely ringed with white. Fore wings long and narrow, ash-gray, with rust-red shadings in mesial band and outer border. Base of wing clear ash. There is no basal line as in *ruberata*, European or North American forms. At a distance out from the body the first black line of mesial band starts from the costa, diagonally across wing to inner margin, with a slight bend outwards at median vein, which is shaded with red. Next the usual wide irregular bluish band from costa to inner margin, shaded outwardly with red; the third line is almost thread-like, and runs zigzag on each vein from costa to inner margin. From this line on inner margin to the first line there extends across the entire mesial band a wide black bar, which is extremely striking. The mesial space is pale ash tinged with red, with a black linear discal spot. The extradiscal line is black and narrow, runs outward to apical dash, then inward, forming a sharp-pointed tooth, bending outward to median

vein, below which it takes a deep outward curve to vein 3, then almost straight to inner margin. Beyond this line is a reddish band, then the usual wide sinuate bluish band, shaded outwardly with red, the outer margin being clear ashen-gray, with minute dots at end of veins; fringe light ash, with black line running through it. There are three black dashes on the veins from the apex of the wing, the lower being the longest and touching the extradiscal line. Hind wings light ash, with the usual two pale lines somewhat scalloped on veins, discal dot showing plainly. Beneath, fore wings grayish, with only the extradiscal black bands and discal spots showing; the same is true of the hind wings. This species runs close to *ruberata*, Freyer, of Europe, which I have, and also examples from Maine of the same, submitted to Mr. L. B. Prout, of England, who said I had identified the species correctly. *Edenata* may be a variety of *ruberata*, but at least not one of the described ones, although I think it is a distinct species. In the Berliner Ent. Zeit., Vol. 51, 1906, p. 256, Freiherr von Hoyningen-Huene discusses the *trifasciata-ruberata* group and describes several new varieties, showing that it is a somewhat variable species.

Types, 1 ♂, Monterey Co., Colo., from Mr. Grossbeck; 5 ♂'s, Eden Vale, Monterey Co., Colo., June, from Mr. Broadwell and Mr. Grossbeck.

MOSQUITO OBSERVATIONS.

BY C. S. LUDLOW, PH. D.

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Beyond the limits of this article it is not my intention to reply to Dr. Dyar's comments.*

A few points in his recent article may be referred to:

(a) The senior author is responsible for what appears under his name, whether he wrote it or not.

(b) It would probably have simplified matters if it had occurred to me to state definitely that, while the specimens are shipped to me in boxes, the collection has never been kept in them. This would have enabled Dr. Dyar to differentiate between these two conditions, for, as he has never seen my collection, he could necessarily know nothing about them; moreover, my method of keeping my collection, even were it as "unfortunate" as Dr. Dyar persistently insinuates, is strictly a personal matter, and lies quite outside Dr. Dyar's province.

*Mosquito Comment, CAN. ENT., March, 1909, p. 101.

(c) Finally, Dr. Dyar's comment as to the disposition of my types shows a lack of acquaintance with the literature bearing on this point.

(d) Since shortly after the publication of the genus *Calvertia*, mihi., I have known of the existence of the genus *Calvertius*, Sharpe, but I have found no reference to *Calvertia*, Warren. However, as I prefer to give the genus a fairly safe name, I propose to call it *Calvertina*, Ludlow. It will therefore appear as

Calvertina, Ludlow.

(*Calvertia*, Ludlow.)

Some recent collections from the Philippine Islands show a number of species not heretofore reported from this locality.

Nyssorhynchus Stephensi, Liston. *Teniorhynchus brevicellus*, ? Theob. *Uranotænia testacea*, Theob. *Neomacleaya Indica*, Theob., and some apparently new forms.

Teniorhynchus (?) *aureosquammatus*, n. sp.—Female: Head dark brown, with whitish and yellow curved scales from occiput to vertex, dark brown, almost black fork scales at occiput, and light yellowish-white flat scales laterally; antennæ brown, verticels and pubescence brown, white, unscaled at the joints; palpi dark brown; proboscis dark brown; eyes brown, partly contiguous; clypeus brown.

Thorax dark brown; prothoracic lobes with a few bristles; mesonotum with bright golden or brassy-coloured slender-curved scales arranged in lines on the cephalad half, the caudad half very dark brown, long brown bristles, especially over the wing joint; pleura dark brown, with white-scaled spots; scutellum light, almost bare, very slender curved light and brown scales arranged in the submedian lines, the apices directed laterad, four long bristles on the median, and three on the lateral lobes, otherwise practically nude; metanotum brown, nude.

Abdomen densely covered with dark brown scales, with purple iridescence and tiny basal lateral white spots on some segments; venter mostly dark scaled, but some basal light bands.

Legs: coxæ and trochanters light, femora ventrally light, and slightly so at the bases, more marked on the hind legs, the remainder of the legs dark, with purple and gold reflections; ungues simple and equal.

Wings clear and heavily scaled with long *teniorhynchus*-like scales; 1st submarginal cell a little longer and narrower than the 2nd, posterior, about the length of the stems; the posterior cross-vein longer than the mid, and interior from the mid about its own length. Length, 6 mm., of

which 2.2 is proboscis. Habitat: Parang, Mindanao, P. I. Taken in December.

The wing-scales suggest *Teniorhynchus*, but the eyes are more contiguous than is usual in that genus and the scutellar scaling is peculiar. The colouring suggests already described *Teniorhynchi*, but the legs are entirely unbanded.

Uranotenia Powellii, n. sp.—Female: head covered with brilliant blue flat scales, except a band of dark brown flat scales, and a few dark brown fork scales in the nape, a very few bristles projecting forward between and around the eyes; antennæ brown, verticels and pubescence brown, basal joint testaceous; palpi dark brown; proboscis dark brown, very long; clypeus brown, with “frosty tomentum”; eyes dark brown.

Thorax: prothoracic lobes testaceous, covered with dark brown flat scales and a few brown bristles; mesonotum light testaceous on the cephalad and laterad portions, and dark brown in the median portion, widening near the wing and extending to the scutellum, the whole covered with very slender dark brown hair-like curved scales; scutellum light testaceous in the median part of the mid lobe, otherwise dark and covered with dark brown flat scales; pleura dark brown, heavily covered with white flat scales; metanotum brown.

Abdomen: first segment entirely brown-scaled, the rest banded with brilliant white scales near the apex of the segments, the brown base of each segment wider than the brown apex; venter with soft light yellow scales.

Legs: coxæ and trochanters almost white, with a few dark scales; femora all light ventrally, dark brown dorsally, while on the cephalic aspect there are on the fore legs two brilliant white spots, on the mid legs a basal white line extending nearly half the length of the femora, with two white spots nearer the apex, and on the hind femora two white spots, otherwise the legs are very dark brown, though the scales may look even ochraceous in some lights; unguis small, simple and equal.

Wings clear, heavily scaled with dark brown scales; the cells are short, the first submarginal the same length as, but much narrower than, the second posterior; supernumerary and mid cross-veins meet and are nearly equal, the posterior a trifle shorter than the mid and about its own length distant. Halteres light stem and dark knob, but heavily dark scaled on both. The scales on the costa are noticeably spine-line.

Length, without proboscis, 4.5 mm.; proboscis, 3 mm. Habitat: Camp Wilhelm, Yayabas, P. I. (Dr. W. A. Powell.) Taken Jan. 3, 1909.

(To be continued.)

INTERNATIONAL CONGRESS OF ENTOMOLOGISTS.

It is proposed to hold the first International Congress of all interested in Entomology at Brussels, Belgium, from August 1st to 6th, 1910. A preliminary meeting of British and Continental Entomologists was recently held in London for the purpose of drawing up a programme and arranging various details. It was decided to form a central executive committee, and to invite various countries to appoint local national committees to co-operate in the organization of the Congress, and to enlist the sympathy and assistance of as many Entomologists as possible in all parts of the world. Among other appointments, Professor Bethune, of the Ontario Agricultural College, Guelph, was selected as Chairman for the Dominion of Canada, and to him may be addressed any requests for further information from residents in this country.

Professor Lameere (President Soc. Ent. Belg.) was selected as President of the Congress, and Mr. G. Severin, 31 Rue Vautier, Bruxelles, General Secretary. The following gentlemen form the preliminary Executive Committee: Prof. Poulton, Messrs. Bouvier, Jordan, Champion, Dixey, Rowland, Brown, Ganglbauer, Horn, Janet, Lameere, Langstaff, and Severin. Dr. K. Jordan, Zoological Museum, Tring, Herts., England, is the Secretary, to whom correspondence should be addressed. A tentative programme will be issued very shortly, and be distributed through the various Entomological journals to all their subscribers.

It is intended that the membership of the Congress should include all interested in any department of Entomology, whether relating to Agriculture, Horticulture, Forestry, Hygiene, Sericulture or Apiculture, as well as to the more directly scientific side of systematic Entomology, insect Psychology, variation, etc. Universities and Colleges in which Entomology forms a part of the curriculum, Experiment Stations, Museums, Natural History Societies, and other organizations, will be invited to send delegates. Every effort will be made to ensure the success of the first Congress, and to make it the beginning of a long series of similar gatherings during the years to come.

COLIAS PHILODICE, VAR. LUTEITINCTA, WOLCOTT.

On August 9th last I captured, a few miles east of Montreal, a beautiful male specimen of the orange-flushed variety of *C. philodice*, described by Mr. R. H. Wolcott in CAN. ENT., XXV, 104, 1893, as var. *luteitincta*. This is the first specimen I have ever taken, and I would like to hear whether it has been recently taken by others, and whether all captures have been made in midsummer, as were the types, or whether it also occurs in either spring or fall.—ALBERT F. WINN, Westmount, Que.

NOTES ON PACHYBRACHYS AND DESCRIPTIONS OF NEW SPECIES.

BY FRED. C. BOWDITCH, BROOKLINE, MASS.

In what is regarded as the most typical *Pachybrachys*, the thorax has a well-defined M-like mark ; it varies with different species from an almost complete M through various partial marks and clouds until, in some cases, it is hardly visible ; but of the thoracic markings, most are variations of this M, and for brevity in description it is called the M ; this is often supplemented by a transverse impression in the rear, terminating on each side in a small shaded depressed area, the depression forming the ends of the M arms ; almost invariably the darker portions of the head and thorax are the most densely punctured.

In the species showing striate, punctate elytra, the best developed (*pallidipennis*, Suff.) shows ten regular striae and a marginal stria, but, in nearly all our species, these striae are more or less broken ; of the costae or intervals, the third, fifth and humeral are the most enduring, and in most species some, or all, of these spaces are more or less indicated ; the third is the most important of the three, and reaches its highest development in forms like *balsas*, nov. sp. The striae on either side are perfect, and form a regular space from base to apex, the inner or third stria is dilated in the middle towards the suture, and forms the elytral or sutural shield, a smooth area about the middle of the elytra, and in many species a marked feature, varying from a regular circle (*inclusus*, Jac.), or triangular spot (*labyrinthicus*, Suff.), to nothing. The punctured scutellar area includes everything between the base, the third interval and the elytral shield or a trifle beyond. In counting the striae, I call the sutural the first.

Where the elytra have dark spots or marks, the typical or standard form seems to be three spots on, or near, the margin, one at, or near, the humerus, one about the middle, and the last about the convexity, and three more spots on the inside, parallel to the suture ; the first is on, or about, the third interval, a little back of the forward edge, the second behind it in the middle, and the third further back on the convexity. All the spots are parallel to each other and the elytral suture. These marks may be spread out so as to join either longitudinally or sideways or be partially or wholly absent ; this spotting or some variation is used in many of the species, and may, for convenience in description, be called the standard form of spots. The most enduring of the spots is the humeral, and when only symptoms of the others appear the humerus will usually be dark. The marginal stria varies greatly in situation behind the curve of

the humerus, from almost straight (*melanostictus*, Suff.), to plainly sinuate; the elytral edge or inflexed side of the elytra begins in the elevated ridge at the base of the elytra, turns round the knob of the shoulder, and is drawn out in a more or less acute edge on the outside of the marginal stria, the curved part below the shoulder is called the lobe, its length, width, curve and punctuation vary considerably.

The following forms seem new:

Pachybrachys brunneus, nov. sp.—Pubescent light brown, sometimes more or less confused with blackish, elytra with stripes of punctures. Length, $2\frac{1}{2}$ –4 mm.

Head convex in front, finely and closely punctate, with a well-defined triangular depression occupying the usual frontal dark space; eyes distant; antennæ, ♀ very short and thin, scarcely attaining the middle of body, a little longer in ♂, darker towards the tip, thorax rather elongated and notably narrowed in front, sides lightly bowed, subangulate in ♀, straight in ♂, depressed behind, with a well-marked ante-scutellar lobe, surface diffusely and very finely punctate, M faintly indicated in livid; elytra slightly narrowed towards the rear, finely punctate striate, the striæ showing in the ♀ a triseriate tendency, which in the best developed specimens forms five quite regular stripes, of which one is sutural and the others occupy about the place of the second, fourth, humeral and marginal intervals, and are traceable nearly to the apex; owing to the pubescence, this arrangement scarcely shows except in a certain light, the intervals are quite wide, smooth and regular; the four examples of what I call the ♂ of this species are much smaller, and have the elytra diffusely punctate, with two or three intervals showing indistinctly, marginal stria very slightly curved at humerus and almost straight behind, the inflexed edge or lobe is of the same width from the curve forward, and abruptly narrowed behind, with a few very fine marginal punctures; below, with the epimera, sides of abdomen, last segment and pygidium, yellowish, with dark rings on thighs; fossa of ♀ deep and shining; some specimens are more or less suffused with black, so as to cover everything except the edges of the elytra and sides of the thorax; in these examples the under side is also dark. Comes near *analis*, Lec.

Phoenix and Prescott, Arizona, five ♀'s, four ♂'s. Type coll., Bowditch.

Pachybrachys Wickhami, nov. sp.—Thickly silvery, pubescent, slender, cylindrical, black, with indeterminate red markings on the elytra. Length, $2\frac{3}{4}$ –3 mm.

Front slightly convex, punctured, eyes distant in both sexes, antennæ very short, barely reaching the middle of the body in ♀, slightly longer in ♂, darkened towards the tip, thorax rather broad, slightly contracted both front and rear, punctures almost invisible through the pubescence, depressed behind with a fairly-developed lobe, hind angles much rounded, leaving the remainder of the lateral edge almost straight, elytra parallel, fairly regular, punctate striate, but much obscured by the pubescence, the red markings seem indeterminate, but consist primarily of root marks on the second, third and humeral intervals, a band below the humerus, running obliquely to the third interval, before the middle; a transverse spot at the middle of the side before the convexity, the tips and a spot just anterior to it. The three ♀ specimens before me vary somewhat in extent of markings, and the only ♂ has the spots considerably suffused and spread out, so that the elytra are almost luteous, below and legs black, more or less picked out with luteous on the usual places.

Three ♀'s, 1 ♂, Tucson, Arizona. Type coll., Bowditch. Should be placed near *hæmatodes*, Suff.

Pachybrachys discoideus, nov. sp.—Stout, black, elytra orange-yellow, with discoidal black mark. Length, $3\frac{1}{2}$ mm.

Head flat, with punctured impressed line; antennæ dusky-yellow, with the end joint smoky, very short, reaching only a little beyond thorax (♀); eyes distant (♀), thorax much wider than long, very much narrowed, or almost compressed in front; transversely impressed behind, ante-scutellar lobe not marked; sides subangulate, sinuate behind, surface thickly punctured, grossly so at the anterior angles, elytra moderately, regularly striate, punctate, except the scutellar area; entirely orange-yellow, except a common sutural stripe which runs from the base to a point in the suture just over the edge of the convexity; the rear ends are beveled to a point from the outside to the suture, marginal stria moderately curved and sinuate, lobe well developed, with a black edge and fine row of marginal punctures, scutel piceous; below and legs black, fossa (♀) round, deep, shiny and small. Near *limbatus*, Newm.

One ♀, P. Orange, Florida. Type in Snow collections.

Pachybrachys marginatus, nov. sp.—Black, with wide, red marginal border from head to tip. Length, 3 mm.

Head black, front convex, thickly punctulate, sparsely pubescent; labrum and antennæ yellowish, latter darker towards the tip, which in ♂ reaches a little beyond the hind coxa; eyes distant; thorax black, the

lateral edge with a wide, red border ; semi-shining, thickly and evenly punctured, and with a smooth and slightly raised median line ; narrowed in front, depressed and somewhat narrowed behind, with an impressed marginal line, making a prominent ante-scutella lobe, lateral edge curved ; elytra black, with a wide red border, which is partially interrupted on the edge, at the convexity ; this border makes an almost straight continuation of the thoracic border, surface closely and diffusely punctate, except the two side intervals are well marked, and in the rear the two intervals nearest the suture are plain ; in some parts of the others the punctuation is finer and sparser at the rear, all below black, with silvery pubescence. Near *limbatus*, Neum.

One ♂. Prescott, Arizona. Type coll., Bowditch.

Pachybrachys Jacobyi, nov. sp.—Colour above pale yellowish-gray ; form stout, robust, shiny, suffusely punctate, slightly narrowed towards the front. Length, $2\frac{1}{2}$ –4 mm.

Head broad and flattened, thickly and coarsely, very light brown punctured, with impressed frontal line ; eyes notably distant in both sexes, and rather small compared with the size of the head, antennæ reaching about the hind coxæ in ♂, not quite as long in ♀ ; first five joints yellow, the remainder gradually dark, with bases of six and seven light ; thorax stout cylindrical, slightly narrowed towards the front, rear edge swollen and depressed, thickly and irregularly finely light brown punctured, the sides excepted ; lateral edge moderately curved, slightly sinuate in ♀ toward the rear ; elytra diffusely and thickly, finely light brown punctate, not, however, as diffusely as thorax, the punctures arranged towards the rear and sides in lines of greater or less length, but not costate or ridged, except that the third, fifth and humeral intervals are at times traceable to a greater or less extent, and a sutural shield is sometimes indicated in the usual place ; curve of the marginal stria very moderate, round the shoulder, and the almost straight edge and lobe rather swollen, especially noticeably in ♀ round the shoulder-hump ; very lightly punctulate on the edge of the curve ; neither of these features are as noticeable in the ♂. All below with legs entirely pallid, except that the meso- and metasternum and the rings of the abdomen are somewhat suffused with brownish-black ; ♀ fossa moderately deep, punctured.

The typical form occurs in California, Arizona, Utah ; certain specimens from La Junta, Colorado, which I refer to this species are much more coarsely punctured and have a greenish tint to the elytra ; in some

of the Colorado ♀'s the punctuation is so coarse that it is almost scabrous, the Bridgport ♀ has a dark mark on the vertex of the head, and the thorax with a very indefinite M; elytra with the standard outside dark marks indicated by faint indistinct clouds. This is the form called *livens*? Lec., by Jacoby in *Biologia*, VI, Pt. I, Supp. p. 151.

Amedee and Bridgport, California; Winslow, Arizona; St. George, Utah. Collected by Wickham, 9 ♀'s, 3 ♂'s, two Arizona, one Texas. Four ♀'s, 4 ♂'s, La Junta, Colorado. Type coll., Bowditch.

Pachybrachys mellitus, n. sp.—Form and size of *Jacobyi*, n. sp., but upper side entirely dark honey-yellow, shining.

Head large and flat, coarsely punctate, almost rugosely so on the usual dark frontal and vertex marks; antennæ with five or six basal joints yellow, rest dark, shorter than *Jacobyi*, not reaching the hind coxæ in ♂; thorax broad: depressed behind, coarsely punctate, the punctures grouped so as to leave irregular, smooth, shiny, elevated areas, with sometimes a smooth median line; the thickly punctured spaces are most noticeable where the dark parts of a thoracic M would naturally occur, and raised areas are most marked at the sides and in ♀'s, thoracic edge lightly subangulate; elytra stout and parallel, punctures as a whole finer than those of the thorax, confused in the scutellar area and behind the humerus, the remainder of the elytral surface striate, punctate, the third, fifth and humeral intervals being the best developed; very few of the thoracic or elytral punctures have any dark colour in them, the elytra are also very lightly transversely wrinkled, this being most noticeable anteriorly, and the effect is to make the elytra a little less shiny than the thorax; the scutellum is also rather long and more pointed than *Jacobyi*, the marginal stria is well marked, lightly sinuate behind the humeral curve, lobe rather abruptly narrowed in rear, with a row of strong punctures reaching well forward of the shoulder; below clothed with silvery pubescence, dark rufous and yellow, with the epimera and sides of abdomen picked out in the lighter colours; legs rufous, with usual lighter spots.

Inyo Mts., ♂, ♀; Mojave, one ♀; Darwin, California, one ♂; Tucson, Arizona, ♂, ♀; St. George, Utah, five ♂'s, one ♀, all coll. by Wickham. Type coll., Bowditch.

The large size and shining yellow colour make this species easy to recognize. The Darwin and Mojave specimens have the punctures of the lobe less well defined.

Pachybrachys Coloradensis, nov. sp.—Small, above pale grayish-white, form elongate, slender, elytra parallel, striate, punctate. Length, $1\frac{3}{4}$ – $2\frac{1}{2}$ mm.

Head large, front nearly flat, rather thickly, brownly punctate, with narrow brownish frontal line, and more or less of a cloud on the vertex; eyes distant, antennæ with first five joints and base of sixth light, after that dark, a little more than half the length of the body; thorax thickly and rather evenly brown punctate, except the edges, depressed behind and often with a small brown spot in the depression before the scutel, edge very lightly and indefinitely rounded; elytra cylinder-shaped, covered with striæ of dark brown punctures, which are diffused in the vicinity of the scutellum and slightly irregular behind and below the humerus; lobe moderate, ♀ with a very well marked row of marginal punctures from upper edge of the curve to end of sinuation, ♂ usually not quite as numerous nor well marked, below black, with epimera, sides of abdomen, venter and pygidium whitish-yellow; legs yellow, with darker spots or clouds on thighs; in some specimens the black of the body under the elytra seems to show through the elytra; the sutural row of punctures is on the edge, and gives the appearance of a very fine black line.

Seven ♂'s, five ♀'s, Colorado Springs, Colorado; Coolidge, New Mexico; Clear Lake, Utah. All coll. by Wickham. Type coll., Bowditch.

Of about the size and shape of *P. densus*, Bow., but lighter in colour and at once separated by the punctate striate elytra.

Pachybrachys densus, nov. sp.—Small, above pale testaceous, or dirty-yellow, very thickly and finely, diffusely, brown punctate. Length, $1\frac{3}{4}$ – $2\frac{1}{2}$ mm.

Head slightly convex in front, the usual dark frontal markings hardly visible, thickly and finely punctulate; eyes distant; antennæ dirty-brown, reaching to first segment of abdomen in ♀; thorax wider than long, thickly and evenly punctate without darker clouds, depressed behind, sides subangulate; elytra of same colour as thorax and entirely, diffusely, thickly punctate, though in one specimen the course of the third, fifth and humeral intervals can be traced; lobe small, wholly occupied by punctures, marginal stria very lightly curved and barely sinuate behind; body beneath dark, with the epimera, abdominal sides and pygidium picked out in lighter colour; legs light, with dark rings on thighs.

♂, ♀, Arizona. Type coll., Bowditch.

Pachybrachys minor, nov. sp.—Small, curved (as seen from the side), dirty, shining yellow, fairly regularly punctate striate. Length, $1\frac{3}{4}$ – $2\frac{1}{4}$ mm.

Head yellow, front convex, very finely punctured, median and vertex lines small, not at all prominent, also with supplemental marks from the upper edges of the eyes, which are distant; antennæ yellow, darker after the middle, reaching in the male to the second segment of the abdomen, thorax yellow, moderately narrowed in front, thickly punctured, the M very indefinitely indicated in brown clouds, transverse depression very light, sides subangulate; elytra yellow, a little wider than the thorax, regularly brown punctate striate, except the scutellar area, which is diffuse and with a confusion behind the humerus, which seems to vary from well marked to almost nothing, the marginal stria is very lightly curved at the humerus and lightly sinuate behind, the lobe is small, with a row of punctures; there is no well-defined shield; the body beneath is black, with the epimera, sides and end of abdomen and pygidium broadly testaceous, especially in the ♀, which has a well-marked fossa; legs yellow, with ferruginous marks, the general upper outline viewed from the side is curved. Two ♂'s, one ♀, Walnut, Arizona. Type coll., Bowditch.

A careful examination of my specimens satisfies me that the form which shows the most disturbance of the elytral intervals behind the humerus is abnormal, and that probably the normal example has only a slight disturbance of the regularity. The ♂'s are narrow and appear curved.

Pachybrachys Lodingi, nov. sp.—Small, stout, almost entirely dirty-yellow, fairly regularly punctate striate. Length, 2 – $2\frac{1}{2}$ mm.

Head flat, medium punctate, usual dark mark on centre and vertex, antennæ yellow, darker, and stouter towards the end and reaching a trifle beyond the middle of the body, ♂, considerably shorter in ♀; thorax tubularly compressed in front, rather evenly coarsely punctured, not crowded (in some specimens the punctures are almost sparse and a good deal finer), the M very indistinctly indicated by clouds, more distinct in the sparsely-punctured specimens, lobe well marked before the scutel, and with the rear edge somewhat swollen and smooth, sides slightly bowed in ♂, rounded in ♀, elytra showing a dark spot on the point of the humerus and sometimes very faintly some of the standard spots, and narrowly black along the suture; punctures moderate in size, confused in the scutellar area and backward along the suture to the convexity, otherwise regularly arranged in striæ, showing intervals, which are fairly regular, except that the sixth and

seventh are a little mixed back of the shoulder and the marginal is a good deal disturbed above and back of the lobe, third is complete and well developed, and exhibits a pretty well-defined elytral shield; the general effect is of quite regular intervals; marginal stria almost subangulate at the lobe in ♂ and sinuate back of that; ♀ not so pronounced, lobe inconspicuous; body below dark with epimera, sides and middle of abdomen, last segment and pygidium yellow, legs pale, with slightly livid clouds, fossa of ♀ large, shallow and round.

Two ♂'s, Spring Hill, three ♀'s, Grand Bay, Alabama, three North Carolina, one Florida. Type coll., Bowditch.

Sent me by Mr. Loding with other species. Three examples from Florida placed provisionally with this species differ by being much more regularly striate and more lightly punctate, and are probably a different species.

(To be continued)

NOTE ON EUPELETERIA, TOWNSEND AND ALLIED GENERA.—The genus *Eupeleteria* was erected on page 111, Tax. Musc. Flies, Smithson, Miscell. Coll., No. 1803 (May, 1908), and three species named as included in it. I herewith propose *Echinomyia fera*, L., as the type of *Eupeleteria*. The genus cannot include *E. magnicornis*, Zett., which must be taken as the type of *Eudoromyia*, Bezzi. I am indebted to Professor M. Bezzi for directing my attention to this point. *E. princeps* is the type of the genus *Pareudora*, Wachtl. I retain *Tachina grossa*, L., as the type of *Echinomyia*, as originally proposed by Brauer and von Bergenstamm.—C. H. T. TOWNSEND.

BOOK NOTICE.

QUATERNARY MYRIAPODS AND INSECTS OF CALIFORNIA, Univ. of California Publications, Geology, Vol. 5, No. 12, by Fordyce Grinnell, Jr.

A report on the fossil *Myriapods* and *Coleoptera* found in the limestone caves of Shasta County, and in the asphalt beds at Rosemary, near Los Angeles. In the *Myriapoda*, two new *Iulids* and a *Spirobolus* are described. Sixteen species of *Coleoptera* are listed, of which three, belonging to the genus *Eleodes*, are described as new. There are two plates, with 44 figures, depicting all of the species. Little work has been done on the fossil insect fauna of California, and many interesting discoveries await the student.—KARL. R. COOLIDGE, Pacific Grove, Cal.

Mailed July 7th, 1909.



THE LATE W. H. EDWARDS.

The Canadian Entomologist.

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No. 8.

WILLIAM HENRY EDWARDS.

For thirty years the name of Mr. William H. Edwards was familiar in the scientific world as one of the two most notable students of the Butterflies of North America, the other being the now venerable and venerated Dr. Samuel H. Scudder, of Cambridge, Mass. Both of these men spent the greater part of their lives in the preparation and production of magnificent works on our diurnal Lepidoptera, to which we owe our present knowledge, incomplete though it may be in many respects, of these beautiful and interesting creatures.

Mr. Edwards, born at Hunter, N. Y., on the 15th of March, 1822, was the son of William W. and Helen Ann Mann Edwards. His father was one of the fifteen children of Judge Timothy Edwards, whose grandfather was the Rev. Jonathan Edwards, of Stockbridge, Mass., the progenitor of many able contributors to American intellectual life. Mr. W. W. Edwards built a tannery at Northampton, Mass., in 1794, and sent his leather to Boston; in 1816, having exhausted the supply of hemlock bark in the Connecticut valley, he removed to Hunter, in Greene Co., New York, and re-established his business on the Schoharie Creek, where he drew his supplies from an estate of 1,200 acres of hemlock forest in the Catskill Mountains. Here our friend was born and brought up, spending his early years in the midst of beautiful surroundings and imbibing a love of nature which continued throughout his life. From the village school he was sent to Williams College, Mass., and completed his course there in 1842; he then studied law in New York, and was admitted to the bar in 1847, after which he made his home at Newburg, N. Y. Subsequently he became interested in the coal fields of West Virginia, and removed to Coalburgh, where he was President of the Ohio and Kanawha Coal Company. He was an extensive land owner in the Virginias of the early days, a builder of railroads, an opener of coal mines, and throughout all his life active in the affairs of the community among whom he dwelt. Though thus busily engaged in commercial pursuits, he always found time to devote to the

study of butterflies and to the preparation for publication of the results of his investigations. His first contribution to the pages of the "CANADIAN ENTOMOLOGIST" appeared in the third number of the first volume, October, 1868, and his one hundred and seventieth in the 30th volume, January, 1898. During this period he also wrote a number of articles, chiefly descriptive of butterflies, which appeared in the Proceedings and Transactions of the American Entomological Society and "Papilio." His first published work, "Voyage Up the Amazon," gave an account of a trip that he made up the great river in 1846, not long after he had left College; it is a delightful record of visits to a number of places where the author employed himself in collecting butterflies, birds and other interesting objects, and is full of vivid descriptions of luxuriant tropical vegetation and the strange creatures that make their abode in the forests and thickets. So true is the narrative then written that the publishers, the Murrays, of London, England, still continue to issue the book as the most reliable guide for a naturalist exploring the river. It was first printed in 1847; the edition before us is dated 1861, and there is still a steady sale of the book. This is certainly a remarkable record for a description of travels written by a young man just out of college.

His *magnum opus*, however, the work which will long continue as a monument to his memory, is "The Butterflies of North America." In April, 1868, the first part was issued and at once commended itself to Entomologists everywhere by the exquisite beauty and finish of the plates and their faithfulness to nature. In July, 1872, the first series, forming a large quarto volume with fifty plates was completed. The second series, containing fifty-one plates, was begun in May, 1874, but not finished until November, 1884; the less frequent issue of the parts being more than compensated for by the increased value of both plates and letterpress. When the work was begun, as Mr. Edwards stated in his preface, little or nothing was known of the eggs, larvæ or chrysalids of any except a few of the commonest butterflies, and accordingly his first volume illustrated only the perfect state. In 1870 he made the notable discovery that eggs could be satisfactorily obtained by confining the female butterfly of any species with the growing food-plant of its larva, and at once he began the study of the life-histories of a number of species previously known only in the imago state. The results of these studies are admirably set forth in the pages as well as on the plates of the second and third series; on these are accurately depicted eggs and larvæ in their different stages, as well as chrysalids and imagoes. Many wonderful discoveries were made during

these investigations, among the first being that of the seasonal trimorphism of *Papilio ajax* and the dimorphism of *Grapta interrogationis* and of *Grapta comma*. The process of breeding was soon taken up by Mr. Edwards's friends and correspondents scattered over North America, and, aided by the general extension of railways over the continent, he was able to get eggs of butterflies from widely distant localities and to follow them successfully through all their stages. It is due to his efforts that the reproach of ignorance of the preparatory states of our butterflies has largely been removed, and though much even now remains to be learnt, vast progress has been made. The first part of the third series was issued in December, 1886; the eighteenth and last in 1897. Far from showing any decline from the author's high standard of excellence, the last issues were regarded at the time as the climax of good work, both on the part of the writer and the artist. In his third volume nearly half of the fifty-one plates are devoted to the alpine or subarctic species of the Satyrinæ, and every species of North American Chionobas, except the Labrador *Taygete*, is figured; of twelve species the various life-stages are fully described and portrayed with a wealth of detail of larval characteristics. As the author states in the preface, "Until these plates appeared no *Erebia* and no Chionobas, except *Semidea*, either in Europe or America, was known in its preparatory stages." All through Mr. Edwards was fortunate in having his wishes ably carried out by his artist-assistants, one of whom, Mrs. Mary Peart, not only drew most accurately nearly all the plates, but in order to do so satisfactorily, reared a large number of the caterpillars; the exquisite colouring by Mrs. Lydia Bowen could not be surpassed. The three large volumes make up a work on the life-histories of butterflies which has no equal anywhere. The accuracy and beauty of the plates are all that can be desired and the pages are filled with original descriptions and observations of many of our rarest butterflies, as well as particulars previously unknown of a large number of more familiar species. It will long continue to be an authoritative book of reference and to form the foundation of all further studies of these most interesting and lovely creatures.

Mr. Edwards was seventy-five years old when he gave up his studies of butterflies, feeling, no doubt, that his advanced age precluded him from carrying on further investigations with the ability and success that he had so remarkably displayed. Far from being idle, however, he became a spirited combatant in the Shakespearean controversy, and in 1900 published

a large volume on the subject, under the title, "Shaksper not Shakespeare." His last work was the compilation of a genealogy of the Edwards family, published in 1903.

For many years during the period of his active studies all new specimens of North American butterflies received by the Smithsonian Institution of Washington were sent to him for description and classification, and also all collections of North American examples possessed by the Imperial Russian Government and any new species from this continent that came to the British Museum were sent to him for identification. He thus became the author of a large number of new species, whose names, conferred by him, will in nearly all cases endure. His own extensive and valuable collections were purchased a few years ago by the Carnegie Institution at Pittsburg and are now in the care of Dr. W. J. Holland, the Director. Mr. Edwards kept up a world-wide correspondence during a long period of years and was an active or honorary member of many scientific societies both in America and abroad. In November, 1868, he was elected an honorary member of the Entomological Society of Ontario, being one of the very first whom our Society recognized as a leader in Entomology, and whose name it felt proud to inscribe on its roll of distinguished members. He was a man of profound and varied learning, a thorough scholar, an earnest student of nature, gifted with more than ordinary powers of observation. To those who knew him well he was endeared by many attractive characteristics; kind, open-hearted, cheery and courteous, free from pride and ostentation, widely respected and foremost in all that pertained to the welfare of the community in which he lived, he attained to a venerable old age and has left behind a fragrant memory that will not soon pass away. On the 2nd of April, 1909, he died at his home in Coalburgh, West Virginia, at the age of 87 years.

C. J. S. BETHUNE.

CENTRAL EXPERIMENTAL FARM, OTTAWA.

It is gratifying to learn that Mr. ARTHUR GIBSON's position in the Entomological department of the Experimental Farm at Ottawa is not affected by the recent appointments to fill the place of the late Dr. Fletcher. He is a member of the "Inside Civil Service" of the Dominion, and his position is permanent, whatever other changes may take place. It is much to be hoped that his knowledge and experience may long be available for the experimental and research work carried on at the Farm, and for the maintenance of the extensive correspondence with enquirers respecting insects in all parts of the Dominion.

GALLS FOUND IN THE VICINITY OF TORONTO.—No. 4.

BY DR. WILLIAM BRODIE, TORONTO.

Rhabdophaga strobiloides, Walsh; *Cecidomyia strobiloides*, O. S.

This is a common willow gall in the vicinity of Toronto, restricted to *Salix humilis*; the galls are very uniform in size and form, usually top-shaped, some inclining to spherical, a little oblate below and prolate above, and as the female oviposits but one egg in the terminal bud of the willow shoot, the galls are terminal and monothalamous.

The gall is a rather tightly and regularly arranged mass of from 70 to 80 aborted leaves, representing perhaps about 1 m. of the leafage of a normal branch.

This has been called the "pine-cone-like-gall"; there may be a suggestion of a resemblance to cones of *Pinus resinosa*, but not to cones of *P. strobus*.

From December 4, 1883, to March 21, 1898, nine annual collections of galls were made, all in the vicinity of Toronto, in all about 1,000 specimens. The average measurement of 200 galls was 12 mm. x 15 mm., and the length of the deformed part of the branch, included in the gall, around which the aborted leaves were packed, was 6 mm.

The larvæ occupy cells central in the galls, formed by the folding of aborted leaves; they are tightly wrapped up in these, head downwards, and no doubt the irritation from the activity of feeding by gnawing the growing end of the twig causes the aborting of the leaves and the development of the gall.

The larvæ mature in the fall and are about 6 mm. long, of a straw colour inclining to orange. They pupate early in the spring or late in the fall, and the pupæ are closely wrapped up in fragile silken cocoons.

The imagoes usually emerge during the first week in May; it may be occasionally that the larvæ emerge from the gall in the fall, hibernate among leaves or other rubbish on the ground, and pupate in the spring; anyway, in two cases, when I had collected the galls early in the fall, I found living mature larvæ on the bottom of the jar.

Although the date of emergence of the imago is usually early in May, I found it range from April 4 to May 15. No doubt the date depends on the temperature of the season. When the temperature is warm the

imagoes do not live long ; I never could keep them in captivity more than three days, but when kept in the cold I have had them over a week, and when brought into the warmth they were perfect and active ; when kept in a large glass jar they paired readily, and the females oviposited in the terminal buds of living willow twigs. I tried them with different kinds of food, sugar, starch, glucose, cherry-tree gum and water, but I could not get them to eat. I do not think that during their brief imago life they either eat or drink.

There are four species of inquilines more or less common in this gall, the most noteworthy being the minute and beautiful *C. albovitta*, Walsh. I found mature larvæ of this inquiline resting in the downy folds of the aborted leaves, well within the gall. They are cylindrical in shape, slightly flattened ventrally, of a pale orange colour, and about $1\frac{1}{2}$ mm. long ; I could find no evidence of feeding. The date of emergence ranged from April 14 to June 23 ; this extreme range may have been from artificial conditions, although I tried to secure natural conditions as much as possible. I found them quite numerous ; one season I had 200 specimens from 54 galls ; another season, 1892, I had 163 specimens from 35 galls.

The common sawfly inquiline emerged sparingly, every season about 2 to 100 galls. A small beetle and a small plume moth similar to the species that is inquiline in galls of *R. triticoides*, emerged rarely.

Among the hymenopterous parasites was the ichneumon, *Pimpla annulipes*. It was not common, and there was a suspicion that it was parasitic on the sawfly larvæ.

Two species of *Torymus*, one with an especially long ovipositor, both resplendent in metallic green and blue colors, emerged about the middle of June.

Two species of small Chalcid parasites emerged a little later than the *Torymus*, and it was thought that at least one of them was a secondary.

The geographical range of this gall is ample ; it extends far to the south, and is common over Ontario. I have found it in Algonquin Park and in the Temagami District, and have galls from Southern and Northern Manitoba, from Alberta and from North Saskatchewan.

There are many complicated and interesting problems awaiting the student of Entomology, in working out the life-histories and interrelations

of the occupants of galls. The living feeding upon the living, without pain or apparent inconvenience, and all this while in the larval form.

Shall we say the relations are physiological and not pathological in any sense? The living plant fed upon by the gall-producer and the inquilines, these by the primary parasites, and these again by the secondaries. A harmonious system of eat and be eaten, and strangely at the same time the eater is often the eaten, and although, in the end, it means death to the eaten, it is not so shocking to our sensibilities as the cat enjoying the agonies of the tortured mouse or the sportsman triumphing over the "fluttering gory pinion."

Rhabdophaga siliqua, Walsh; *Cecidomyia salix-siliqua*, Walsh.

Galls nearly terminal on upland willow twigs (*Salix humilis*), flask or rather horn-shaped, usually curved, ending above in a slightly-curved beak, out of which the occupants emerge. The galls are aborted buds, and when overtopped by the twigs lie closely to them. The galls are often striated, of a greyish-green colour, corresponding to the colour of the twig, and rarely bear a few leaves. The average of 30 galls collected in the fall of 1882 was 7 x 12 mm. From this lot collected Dec., 1882, the producers, *R. siliqua*, emerged May, 1883, and towards the end of June numerous specimens of the Chalcid parasite, *Torymus splendidus*, emerged. Walker described and named this beautiful *Torymus* from specimens collected at Hudson's Bay, which may be accepted as presumptive evidence that this gall may be found there. In any case the geographical range is large. This gall is more or less common over Ontario where *Salix humilis* is found; it is more or less common in North York, Muskoka, Algonquin, Temagami, and along the Montreal River on *Salix discolor*. During the fall and winter seasons of 1886 and 1887, I received several parcels of this gall from Northern Manitoba, collected from some species of willow; they were in every particular similar to Toronto galls, but no producers emerged from them. In the spring of 1887 I received from Mrs. W. A. Ducker a parcel of galls collected at Banff, Alta., from a species of willow; in size and shape they were identical with Toronto and Manitoba galls. Mrs. Ducker wrote: "The galls are on the ends of willow branches. I do not know the willow, but both willow and galls are common all around Banff." Producers emerged

from these galls during the last week of April, 1887, and I failed to separate them from Toronto specimens.

From 1883 to 1888 several annual collections of galls were made, all from *S. humilis*, from Toronto and from a locality 35 miles north. From these emerged numerous specimens of the producer, the parasite *Torymus splendidus*, and a few specimens of the Chalcid parasite *Encyrtus bucculatricis*, Howard, a species seldom reported as occurring in Ontario.

Rhabdophaga cornu, Walsh, *Cecidomyia salix-cornu*.

These galls are deformed lateral buds towards the ends of branches of upland willow (*Salix humilis*). They vary much in form and size, from semi-cylindrical, measuring 9 x 25 mm., to somewhat ovoid, measuring 7 x 10 mm.: the average of 200 galls was 8 x 20 mm. The galls are flask-shaped, slightly curved, rounded at the base, tapering towards the upper end, which ends in a slightly curved beak, out of which the occupants emerge. They resemble the galls of *R. siliqua*, but are considerably larger. They are hard and woody, of a greyish-brown colour resembling that of the branches, and often bearing leaves, occasionally branchlets 1 to 3 inches long, and rarely ♂ and ♀ catkins. On August 1st, 1893, I found these galls full size, but soft, easily cut with a knife, and of a greenish-yellow colour corresponding to that of the branches of the season. Annual collections of galls were made from 1883 to 1893—most of these from near Toronto, some from distant points, Port Sydney, Muskoka, Temagami, and other localities. The date of emergence of producers varied from April 26 to May 12; the parasites *Torymus splendidus*, Walk., and *Encyrtus bucculatricis*, Howard, emerged about 20 days later, and still later emerged two species of Chalcid parasites, *Pteromalus* (?) especially numerous one season (1885). From a lot of galls sent to me from Owen Sound I reared two specimens of the parasite *Torymus Brodei*, Ashm., which is a more or less common parasite of the White Oak leaf galls, *Acrespis pezomachoides*. Two seasons there emerged many specimens of a thrips; the function of these was probably inquiline. In cutting open some of the old galls, in one I found a curculionid beetle. The interior cell of the gall is ample, extending from the base to apex of tube, and in spring the larvæ and pupæ are enclosed in a fragile silken cocoon. The producer is a fine large Cecidomyid, one of the most beautiful of the group.

The geographical range is wide; I have received specimens from Oak Lake and Souris, Man., and from Tisdale, Sask.

STUDIES IN THE CARABOIDEA AND LAMELLICORNIA.

BY THOS. L. CASEY, WASHINGTON, D. C.

The following studies have been in view on the part of the writer for some time, but no good opportunity to complete them offered itself until very lately, when Mr. Fuchs sent me a good assortment of the various forms of *Omus* from his collection. This material, together with my own, gives me a tolerably full and representative series from various localities upon which to base a new tabular statement, although, unfortunately, some of the described species are still unknown to me. Some isolated studies in *Cicindela* and a few Carabids and Lamellicorns, believed to be new, are made known in addition.

CICINDELIDÆ.

Amblychila, Say.

The difference between the *cylindriciformis* and *Baroni* types in this genus are almost subgeneric in nature. The following is apparently a subspecies of *Baroni*:

A. longipes, n. subsp.—Form elongate, flattened above, but feebly ventricose, deep black throughout, densely alutaceous or subopaque above, feebly so and more shining beneath; head nearly as in *Baroni*, the antennæ very long, three-fourths as long as the body; labrum bluntly and approximately bidentate medially; prothorax evidently wider than the head, as long as wide, obtrapezoidal, with feebly arcuate sides, more rounded anteriorly, the apex broadly, evenly and feebly arcuate; surface evenly convex, the median line finely striiform; elytra fully three-fourths longer than wide, barely a fourth wider than the prothorax, with fine scattered asperate punctures, serially arranged, the lateral carina fine and rather broken, extending nearly to apical third, with a similar carina parallel and a short distance above it, extending about as far posteriorly, also a few elongate carinules, forming a third short subbasal and disconnected line; legs long and slender, the hind tibia and tarsus subequal and together fully three-fourths as long as the body. Length (♂), 21.7 mm.; width, 7.3 mm. Arizona (Baboquivari Mts.), F. H. Snow.

Differs from *Baroni*, as evident from the photograph of the type published by Mr. Rivers (Zoe IV, 1893, p. 218), in its less inflated, more elongate and less shouldered hind body, with relatively smaller punctures and a well-developed second pleural carina at a short distance above the first, in the larger prothorax, with less arcuate anterior margin, and in its

apparently longer legs, the comparison being made from the male in each instance.

Omus, Esch.

In this genus it is impossible to say that any really serious work has ever been attempted, and time and material are still insufficient to bring the present study under any such purview. It may be expedient, however, to correct at this opportunity certain impressions, possibly derivable from the recent publications of Dr. W. Horn, of Berlin, who has left the subject in such a condition of uncertainty, that few apparently consider it worth while to give much attention to the taxonomy of the genus from any point of view. This author has placed practically all the Californian forms under a single specific heading, granting to none of them any higher status than the subspecies. The absurdity of this decision can best be demonstrated by means of the accompanying outlines (Fig. 7), drawn from

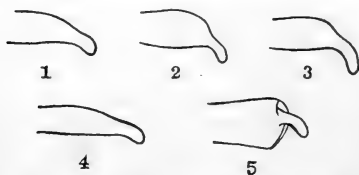


FIG. 7.—1, Copulatory spicule in *Omus Tularensis*; 2, same in *O. Duini*; 3, same in *O. parvicollis*; 4, same in *O. lugubris*; 5, same in *O. elongatus*.

the protruded male generative organ of a number of species, which, as can be readily perceived, differ so much in several cases as in all probability to prohibit copulatory union of the sexes,—the best possible proof of specific isolation. These drawings are not in any case foreshortened, but are the

accurately delineated outlines as seen in a direction truly perpendicular to the plane of the lateral face of the organ. In the case of *elongatus* the intromittent spicule is so aberrant that I carefully looked for some evidence of accidental deformation, but could find none; the substance of the spicule is densely chitinated, and, viewed under higher power, betrays no indication of injury; but the divergence from the usual conformation is so radical, in a species not notably aberrant otherwise, that I do not desire to maintain definitely that we may not be dealing here with a most remarkable deformity in the unique type of the species.

In regard to sculpture of the elytra, Dr. W. Horn states that it is without weight in distinguishing species, referring particularly to the extreme case of *punctifrons* and *confluens*; but, on the other hand, Dr. G. H. Horn states, in the remarks under his description of *LeContei*: "The elytral sculpture is remarkably uniform in all the specimens of *Omus* that

have passed through my hands, scarcely any variation occurring in many individuals of all the species examined."* As far as I have been able to observe, in series of individuals known to have been collected together in one environment, there is comparatively little variability in sculpture, so that radical departures in this respect are virtually sure signs of specific or subspecific difference.

The genus *Omus* may be divided into three quasi-subgeneric groups of species, each distinguished by a remarkable peculiarity of habitus, as follows :

Pronotum without tactile setæ along the side margins.

Elytra with very large and conspicuous foveæ ; species stout and of large size. Northern coast regions Group I (*Dejeani*)

Elytra with small and more or less inconspicuous foveæ ; species smaller, more abundant in the southern regions and disappearing through smaller and more depauperate forms to the northward.

Group II (*Californicus*)

Pronotum with numerous tactile setæ along each side margin ; body sub-metallic ; form rather slender and subcylindric ; foveæ inconspicuous.

Group III (*submetallicus*)

The *Dejeani* group, composed of *Dejeani* alone, is so well known that it needs no further attention here ; and the *submetallicus* group, also at present monotypic, is completely unknown outside of the Horn collection ; so my remarks are here limited to the *Californicus* group only. This group is remarkably plastic, and consequently rich in species and subspecies, as may be inferred from the following tabular statement :

Species of the coast regions	2
Species of the Sierras	9

*So the doctors disagree, as in the trite old saying, and, in the dilemma thus created, the average collector knows not which horn to seize. My own opinion is that if Dr. W. Horn had exercised even slight acumen in dealing with his material, he would have seen that nearly all the erratic variation in sculpture that he announces is due to confusing and mingling together different taxonomic units ; call these units what he may, they are constant and fixed forms, which have developed in the numerous isolated valleys of the broken mountain regions of California, or at different elevations, and it serves no useful purpose to refuse to give them proper value, besides leading to needless complexity in nomenclature. There is nothing gained by holding that what are commonly known as subgenera or well-marked groups of species are the only real species, and then stringing out from each numerous impossible categories of subsidiary forms. If the binomial, and possibly even the trinomial, system is not to be lost in chaos, we must descend from such an unphilosophically exalted idea of species.

2—Elytra more gradually narrowed behind from only slightly behind the middle, the apex acutely ogival, their surface coarsely and very irregularly punctate, with the foveæ deep and evident. Northern regions 3.

Elytra more rapidly converging and rounded in about apical third, except in *LeContei*. Regions near San Francisco and to the southward . . . 4.

3—Pronotum rapidly and deeply declivous laterally toward apex, so that the anterior angles are scarcely at all observable from a vertical viewpoint, the rugæ obsolescent medially. Length, ♂, 12.5–13.5, ♀, 14.0–15.5 mm.; width, ♂, 4.7–5.0, ♀, 5.5–5.8 mm. Oregon and Washington State. *Audouini*, Rche.

Pronotum and general form of the body as in *Audouini*, except that the elytra are more elongate, more obtuse at apex, elliptical, less convex, similarly devoid of humeri in the male, and rather less irregularly, though very coarsely punctate; the head and labrum similar, except that the upper surface is coarsely and deeply rugose throughout, without smoother or punctate medial anterior region, the pronotum similar in form but deeply and conspicuously rugose throughout, almost as strongly as in *Californicus*; colour deep black. Length, ♂, 14.0 mm.; width, 5.1 mm. Probably Northern California.

minus, n. sp.

Pronotum not rapidly declivous laterally, with the apical angles fully visible from above. Body deep black, more shining than in *Audouini*; head more strongly bi-impressed, feebly rugose, finely, sparsely punctate medially toward the epistoma, the labrum with a broadly trapezoidal projection and very few widely-spaced punctures, not broadly arcuate medially as in the two preceding; prothorax rather more transverse and relatively larger, moderately obtrapezoidal, with feebly and subevenly arcuate sides, the side margins coming far from attaining the basal bead, the surface rugose, less obsoletely so medially than in *Audouini*; elytra three-fifths longer than wide, only about a third wider than the prothorax, with less evident humeri in the female, but nearly similar, though rather less irregular sculpture. Length, ♀, 14.8 mm.; width, 5.5 mm. Oregon . . . *borealis*, n. sp.

4—Pronotum strongly and deeply vermiculato-rugose throughout 5.

Pronotum feebly, though very evidently rugose, and likewise subequally so throughout; size generally larger, the form tending to greater elongation 6.

- 5—Body strongly convex, deep black, shining; head broadly bi-impressed anteriorly, coarsely rugose, more finely and feebly anteriorly, but not punctulate, the labrum with a rather narrow truncate median projection; pronotum not rapidly declivous laterally, the anterior angles distinct from above, the sides broadly rounded, more converging basally, the lateral margins attaining the basal bead, the surface strongly rugose throughout; elytra short, three-fifths longer than wide, oval, the humeri rather evident, though broadly rounded and subequally so in both sexes, the surface coarsely, closely and irregularly punctate, with the deep foveæ evident. Length, ♂, 13.0, ♀, 16.0 mm; width, ♂, 5.3, ♀, 6.0 mm. Near San Francisco. Abundant. [♂ = *Hornianus*, W. Horn]..... *Californicus*, Esch.
- A—Rather less convex, slightly larger and less ventricose, the elytra notably more elongate, deep black, almost as shining; head with the rugæ less coarse and much deeper throughout, the labrum broadly and evenly arcuate medially; prothorax relatively a little larger in the male and more nearly equal in relative size in the two sexes, the sides still more rapidly converging behind the middle in the male, the rugæ even deeper and similarly equal and dense throughout; elytra more elongate, the sculpture rather less coarse, less irregular and rather denser; male and female more nearly equal in size. Length, ♂, ♀, 14.5–16.0 mm.; width, 5.3–6.0 mm. Napa County..... *sculptilis*, Csy.
- 6—Elytra widest before the middle, gradually narrowing and with less arcuate sides thence to the apex, black, shining, the head sparsely rugose, smooth anteriorly; prothorax slightly wider than long, obtrapezoidal, the sides arcuate and gradually converging to the base, the surface feebly shining, intricately wrinkled, but not so strongly as in *Californicus*, the median line nearly obsolete, the anterior transverse impression very faint; elytra shining, with large punctures, each distinct and with feeble foveæ. Length, ♂, 17.0 mm. Vicinity of Monterey..... *LeContei*, G. H. Horn
- Elytra regularly oval or, in the female, slightly shouldered, widest at about the middle..... 7
- 7—Pronotum almost plane medially, somewhat as in *sequoiarum*. Differs from *LeContei* in having the head anteriorly finely rugulose and the median stria of the pronotum almost obsolete; antennæ long and stout; hypomera broadly visible from above. Length, 16.0–18.5 mm. Probably from vicinity of Monterey; possibly a composite, the male

being one species and the female another from a different zoological region.....*Fuchsi*, W. Horn

Pronotum evidently convex throughout, the transverse anterior line and median stria both very distinct..... 8

8—Vermiculate rugulosity of the pronotum very coarse, broad and unusually feeble. Deep black, shining; head with very coarse though rather shallow rugæ, becoming smooth and punctureless only along the epistomal suture medially, the labrum broadly arcuate and uneven medially; antennæ moderate; prothorax slightly transverse, moderately narrowed at base, the sides notably arcuate, becoming parallel in about apical third; elytra evenly elongate-elliptical, without humeri (♂), the punctures rather small and notably sparse throughout. Length, ♂, 16.5 mm.; width, 5.8 mm. Near San Francisco, G. W. Dunn.....*elongatus*, Csy.

Vermiculate rugulosity of the pronotum fine, close and much deeper, but not so strong as in *Californicus*. Similarly deep black and shining, strongly convex and less elongate; head more finely wrinkled, but otherwise nearly similar; prothorax nearly similar in form, but very much more finely and relatively more strongly rugulose; elytra much shorter and with feeble humeri in the male, much more pronounced in the female, the punctures rather small and sparse, though deep, the foveæ small and sparse. Length, ♂, ♀, 15.5–16.0 mm.; width, 5.7–6.0 mm. Vicinity of San Francisco, G. W. Dunn.. *Dunni*, n. sp.

A—More elongate, but otherwise nearly similar, strongly convex; head similar, but with a more abruptly-defined and smoother medial area at apex, the labrum differing decidedly in having an abrupt truncate medial projection, which is feebler in the female; prothorax nearly similar; elytra similar in general form in both sexes, but notably more elongate and with the punctures much larger, deeper and more close-set, the foveæ evident. Length, ♂, ♀, 16.0–17.5 mm.; width, 5.6–6.25 mm. Monterey Co. (Carmel), Chas. Fuchs.....*regularis*, n. subsp.

B—Still narrower, relatively more elongate and less convex, also less shining, deep black; head nearly as in *regularis* and deeply bi-impressed anteriorly, more coarsely rugose, the anterior smooth area evident, the labrum similar, the eyes somewhat larger; prothorax similar; elytra subdepressed, similarly elongate but more

evenly elliptical (♂) and with barely a trace of humeri, the punctures much smaller and sparser, being more nearly as in *Dunni*. Length, ♂, 15.0 mm.; width, 5.1 mm. Monterey Co.

maritimus, n. subsp.

- 9—Form more elongate and generally more shining.....10
 Form stouter and usually duller in lustre, frequently opaculate.....20
 10—Elytra strongly convex; body rather large, usually notably slender, with the head and prothorax smaller as a rule. Species more southern in habitat.....11
 Elytra less convex, frequently somewhat depressed, the head and prothorax relatively larger. Species of the middle or more northern Sierras. 15
 11—Elytra elliptical, widest in front of the middle, moderately convex, closely, not deeply punctate, confusedly so toward apex. Moderately stout, deep black and shining; head moderate, rugulose throughout, except at the middle of the front, where it is smooth and sparsely punctate, the anterior impressions feeble; labrum bisinuate, the median lobe arcuately advanced; antennæ moderate; prothorax with the sides moderately converging to the base, feebly arcuate, the surface rugulose throughout, but not deeply, the median stria very fine, the fine side margins attaining the base. Length, 17.0 mm. Mariposa Co. (Coulterville).....*intermedius*, Leng
 Elytra widest at the middle, convex.....12
 12—Elytral punctures small and widely separated.....13
 Elytral punctures larger, deeper, more rounded and narrowly though clearly separated.....14
 13—Form very elongate, the frontal parts of the head almost smooth but never distinctly punctate, the vertex with two not very widely separated, small smoother spots between the eyes, the spots not impressed. Form more parallel, black; head and elytra moderately shining, somewhat alutaceous, the pronotum subopaque; head feebly rugose almost throughout, the frontal impressions large, moderate in depth; labrum broadly arcuate medially, the antennæ long and somewhat slender; prothorax larger, two-thirds as wide as elytra (♂), wider than long, the sides strongly converging behind about apical third, parallel anteriorly, the surface finely but distinctly vermiculate throughout; elytra twice as long as wide, elliptic, without humeri (♂), the two series of foveæ distinct, the punctures strong, but small and widely separated. Length, ♂, 17.5 mm.; width, 6.0 mm. Tulare Co. Without more accurate indication of locality...*procerus*, n. sp.

A—Form less parallel, the head and prothorax relatively very much smaller in both sexes, the latter but little more than half as wide as the elytra; other characters nearly as in *procerus*, except that the prothorax is not wider than long (♂), or but slightly so (♀), and with the regulosity still feebler, sometimes almost obliterated; elytral punctures still finer, very small and decidedly sparse, the foveæ smaller and less evident, the humeri wanting (♂) or feebly evident (♀). Length, ♂, 15.5–17.5, ♀, 18.0–20.0 mm.; width, ♂, 5.6–6.4, ♀, 6.7–7.0 mm. Tulare Co. (Redwood and Mabel Creeks and Watson Springs). The largest female is less shining than the other examples, in fact almost opaque, and has the head and prothorax relatively somewhat larger, with the sides of the latter rather more rounding basally and with its surface more finely and evidently rugulose *parvicollis*, n. subsp.

Form less elongate, deep black, slightly alutaceous, the head rugose, feebly, obliquely bi-impressed anteriorly, with the median apical surface not smooth, but evidently though finely and confusedly to transversely rugulose, the vertex between the eyes with two small and rounded, smoother and usually well impressed spots. Labrum broadly arcuate medially; antennæ less elongate; prothorax wider than long, decidedly transverse in the female, strongly obtrapezoidal, the converging sides becoming nearly straight basally, more rounded anteriorly, the surface finely but evidently rugose throughout; elytra moderately elongate, convex, barely at all shouldered (♂), or very evidently so (♀), the punctures rather small but deep, and widely separated, their bottoms briefly sublineiform. Length, ♂, 16.0–17.0, ♀, 17.5–19.5 mm.; width, ♂, 5.8 mm., ♀, 6.6–7.0 mm. Calaveras Co. (Mokelumne Hill), F. E. Blaisdell. *Blaisdelli*, n. sp.

14—Form nearly as in *Blaisdelli*, deep black, rather shining, more so beneath as usual; head rugose, finely and feebly so in the middle anteriorly, the two spots of the vertex larger, not impressed and with coarser, more vorticeform rugæ; labrum very broadly arcuate medially, the antennæ moderate; prothorax obtrapezoidal, wider than long, the converging sides slightly more arcuate basally, strongly rounding anteriorly, the surface evidently though not strongly vermiculato-rugose throughout, the transverse impressions and median stria distinct; elytra moderately elongate, convex, feebly shouldered (♂), or rather evidently so (♀), the punctures coarse,

deep, more rounded, isolated though not so sparse as in the preceding forms. Length, ♂, ♀, 17.0-19.5 mm.; width, 6.1-7.3 mm. El Dorado Co. (Placerville) *cribripennis*, n. sp.

- 15—Larger species, the front nearly smooth medially at apex; prothorax unusually narrowly rounded and prominent at the sides at apex, and more rapidly narrowed thence to the base than in any other species except *Dejeani*, the sides straight, the reflexed lateral margin more prominent near the base than elsewhere, owing to the greater lateral depression of the surface at this point 16

Small species, the front always finely but distinctly punctured in the middle anteriorly; prothorax more normal in form, less narrowed basally, the sides more broadly rounded anteriorly, the reflexed margin not more prominent near the base; elytra only feebly convex 17

- 16—Elytra shorter, about one-half longer than wide, broadly and more evenly convex, shining black, the elytra deep piceous-black; head with two long oblique anterior impressions, very feebly rugulose, smooth anteriorly, the labrum broadly, evenly arcuate medially and not much produced; antennæ moderately stout; prothorax with the apical width scarcely exceeding the length (♂), the surface shining, the rugulosity fine and feeble, the transverse impressions and median stria strong; elytra distinctly shouldered, finely and sparsely punctate, the foveæ very few and subobsolete. Length, ♂, 16.0 mm.; width 6.1 mm. Placer Co. (Lake Tahoe, apparently confined to that locality) *Edwardsi*, Cr.

A—Nearly similar, shining, black, the elytra not obviously piceous, the rugulosity of the head and pronotum much stronger, the labrum strongly produced in the middle in a somewhat narrowly and abruptly truncate trapezoidal median lobe; elytra strongly shouldered (♀), the punctures similarly small and sparse but more impressed, the foveæ larger, more distinct and more numerous but still few in number and only moderately evident. Length, ♀, 18.0 mm.; width, 6.5 mm. Placer Co. *lobatus*, n. subsp.

Elytra decidedly more elongate, relatively narrower, more than one-half longer than wide and distinctly flattened. Body deep black throughout, the elytra not paler, shining; labrum throughout as in *lobatus*, strongly produced and trapezoidal medially; head obliquely impressed anteriorly, smooth between the impressions, elsewhere

distinctly rugose ; prothorax with the apical width decidedly greater than the median length, finely, densely rugulose and somewhat alutaceous or dullish ; elytra evidently shouldered, subequally so in the sexes, much narrower in the male, the punctures deeply impressed, moderately small, partially sublineiform, well separated discally, larger and densely crowded laterally and apically. Length, ♂, ♀, 16.5–17.0 mm.; width, 6.1–6.7 mm. Placer Co.

montanus, Csy.

- A—Almost as in *montanus* but still more slender in the male, and stouter, with relatively larger prothorax in the female, shining and deep black throughout ; prothorax similar in form but very highly polished, the rugulosity not so dense though almost as evident throughout ; elytra similar in general form, but with the punctures very small and sparse suturally, becoming much larger but still well separated laterally, partially confused apically. Length, ♂, ♀, 14.7–17.5 mm.; width, 5.7–6.8 mm. Placer Co.

lucidicollis, n. subsp.

- B—Body rather more abbreviated, the prothorax notably shorter, shining, dark piceous throughout ; prothorax sculptured as in the preceding but not quite so lustrous, though more so than in *montanus*; elytra (♀) as narrow as in the male of *montanus*, similarly shouldered, the punctures much larger than in either of the preceding, more rounded, deeply impressed, less widely separated suturally, becoming coarse, deep and crowded laterally and apically. Length, ♀, 16.0 mm.; width, 5.9 mm. Placer Co.

brunnescens, n. subsp.

- 17—Labrum trapezoidal and rather strongly advanced medially, with the apex truncate. 18
 Labrum very broadly and evenly arcuate and but very slightly advanced medially 19
 18—Form rather slender (♀), black, moderately shining ; head with two small shallow impressions anteriorly, in great part feebly rugose ; antennæ moderate ; prothorax slightly wider than long, the sides very feebly arcuate, becoming rounded and parallel in apical third, the surface rather strongly but not very closely vermiculato-rugose, the median stria very fine and feeble ; elytra three-fifths longer than wide, scarcely at all shouldered, gradually ogival pointed behind, the punctures coarse but well separated suturally, becoming scarcely so large but deeper and very close-set laterally, each puncture with a

pronounced asperity at its anterior margin, the interspaces with a few very fine and extremely feeble scattered punctules. Length, ♀, 14.5 mm.; width, 5.4 mm. Levette cabinet,—probably from the middle Sierras *punctifrons*, Csy.

- A—Similar, except that the male is fully as stout as the female of *punctifrons*, and the labrum, instead of having the usual close-set series of, setiferous punctures, is smooth, polished and with only four apical punctures, omitting those at the angles; prothorax similar; elytra more shouldered, much more rounded and obtuse at apex and with the punctures smaller, much closer and irregularly subconfluent throughout, the foveæ similarly larger than usual but very few in number and not conspicuous. Length, ♂, 14.0 mm.; width, 5.3 mm. Sierra Co. *degener*, n. subsp.

Form (♀) slightly stouter than in *punctifrons*, the head nearly similar, but with the rugæ and anterior punctures finer; prothorax relatively larger, more finely rugulose and rounding and parallel at the sides in apical two-fifths; elytra more broadly oval, similarly acute at tip but more shouldered at base, the margins more strongly reflexed, and the punctures smaller and densely confluent throughout. Length, ♀, 14.2 mm.; width, 5.6 mm. Origin as in *punctifrons* . . *confluens*, Csy.

- 19—Body (♂) decidedly slender but with relatively rather large prothorax, deep black, alutaceous, the elytra shining; head very finely wrinkled, the anterior impressions large but shallow; prothorax distinctly wider than long, much wider than the head, of the usual form in this group, densely and rather strongly rugulose throughout, the transverse impressions and median stria feeble; elytra scarcely more than one-half longer than wide, feebly shouldered, gradually obtusely parabolic apically, the punctures coarse, irregular, rather evidently separated, the interstices shining with faint alutaceous lustre. Length, ♂, 14.0 mm.; width, 5.1 mm. Placer Co. *fraterculus*, n. sp.

- 20—Pronotum finely and generally closely but obviously wrinkled throughout; head rugose, obliquely bi-impressed anteriorly, with the intermediate surface smoother and more or less distinctly, finely punctate, as in the preceding group 21

Pronotum smooth centrally, the vermiculate sculpture wholly obsolete . . 22

- 21—Elytral punctures moderate, rather close-set. Body deep black, dull in lustre, the elytra more shining; head rugose; labrum strongly advanced medially; antennæ moderately stout; prothorax wider than long, only moderately narrowed posteriorly, with the sides more or

less arcuate or more rapidly rounding inwardly at the base, becoming rounded and parallel anteriorly, the side margins sometimes not quite attaining the base, the impressions feeble, the median stria fine; elytra oblong-oval, widest at the middle, moderately convex, the foveæ seldom distinct; male and female not differing much. Length, ♂, ♀, 15.0-17.0 mm.; width, 6.0-6.4 mm. Calaveras Co., near the "Big Trees" *sequoiarum*, Cr.

- A—Nearly as in *sequoiarum*, except that the prothorax is relatively larger and rather more narrowed from near the apex to the base, with straighter sides, which however curve similarly inward at base; elytra differing decidedly, being blackish-piceous, more shouldered at base, widest before the middle, the sides thence gradually converging and broadly arcuate to the more ogival apex, the punctures somewhat coarser. Length, ♂, 16.5 mm.; width, 6.4 mm. Levette cabinet. Probably from the vicinity of Calaveras Co. *lugubris*, Csy.
- 22—Elytral punctures coarse, deep and very conspicuous; sides of the prothorax moderately converging and nearly straight behind apical third, thence strongly and conspicuously rounding to the base, the disc evidently rugose near apex and base throughout the width, smooth medially 23
- Elytral punctures very shallow and much less conspicuous; sides of the prothorax similarly converging and nearly straight, but much less rounding inwardly at base, the disc nearly smooth apically as well as medially, but rugulose along the base 24
- Elytral punctures wholly obsolete, the surface perfectly smooth; prothorax as in the preceding, but smooth throughout, except toward the sides along the base, the labrum more prominent medially than in either of the preceding groups 25
- 23—Body very dull and densely alutaceous throughout above, shining beneath, deep black; head evidently rugulose, smoother but scarcely punctate anteriorly, the labrum arcuately prominent medially; antennæ short and rather stout; prothorax much wider than long, with the sides as converging as in *Tularensis*, three-fourths as wide as the elytra (♀), the base broadly bisinuate; elytra widest at the middle, slightly more than one-half longer than wide, oblong-oval, rather convex, somewhat shouldered at base, rapidly, acutely ogival at apex, the surface strongly micro-reticulate, the punctures sub-contiguous, deeper, better defined and somewhat confused laterally

and apically, the foveæ inconspicuous. Length, ♀, 15.5 mm.; width, 6.2 mm. Mariposa Co. (Wawona).....*collaris*, n. sp.

Body smaller, shorter, more ventricose, similarly deep black and notably convex but with relatively smaller head and prothorax, the two latter densely dull, the elytra notably shining; head very obsoletely rugulose, smooth anteriorly, the labrum more unevenly prominent medially, where there is a small feeble sinus; prothorax distinctly wider than long, the base four-fifths as wide as the apex, barely two-thirds as wide as the elytra, the latter very short, scarcely one-half longer than wide, widest somewhat behind the middle, very obtuse apically, narrowly shouldered basally, the punctures still larger, notably deeper, more separated and better defined, each similarly with a small anterior asperity. Length, ♂, 14.5 mm.; width, 6.0 mm. Mariposa Co (Wawona).....*compositus*, n. sp.

Body robust, dull black, with a slight silky lustre; head with a few indistinct rugæ between the eyes; prothorax but little wider than long, subquadrate, less narrowed behind than in any other species and less convex, the hind angles rounded; disc slightly rugose at base and tip, the transverse impressions distinct but not deep, the dorsal line fine; elytra rather broadly ovate, wider than the prothorax, much rounded on the sides, deeply punctured, with a few larger but not conspicuous punctures intermingled; legs rather slender, about as in *Audouini*. Length, 16.5 mm. Yosemite Valley. A single female specimen—apparently still unique.....*Horni*, Lec.

- 24—Form very stout, convex, unusually ventricose, deep black, alutaceous; head almost smooth, with two small feeble impressions between the eyes, generally confluent with the oblique shallow frontal impressions, the labrum broadly, unevenly arcuate medially though somewhat advanced beyond the angles, the sinuses small and rather feeble; antennæ stout; prothorax large, wider than long, though but little so in the male, the sides moderately converging and broadly, very feebly arcuate, the base three-fourths as wide as the apex; elytra much more inflated in the female than in the male, somewhat shouldered basally and rapidly obtusely ogival apically in both, widest at the middle, the surface sericeous, the foveæ generally very evident. Length, ♂, ♀, 15.0–17.5 mm.; width, 5.9–7.0 mm. Tulare Co. (Davenport, 6,400 feet; Soldiers' Camp, 5,800 feet, and Colony Mill, 5,415 feet).

Tularensis, n. sp.

- A—Nearly as in the preceding, but more slender in form in the male, with the antennæ evidently less stout, the labrum more nearly truncate, the prothorax rectilinearly truncate at base, and not broadly and feebly bisinuate as in *Tularensis*, the elytra less shouldered at base, with the punctures smaller, still feebler and less close-set. Length, ♂, 14.8 mm.; width, 5.4 mm. A single specimen marked simply "Tulare Co" *gracilior*, n. subsp.
- 25—Body in the female stout, though more elongate and not so briefly ventricose as in the same sex of *Tularensis*, alutaceous, deep black; head smooth, the anterior impressions rounded, distinct, the labrum strongly produced in the middle in a trapezoidal lobe; antennæ moderate; prothorax formed as in *Tularensis*, the anterior impression deep and obliquely sulciform laterally, the portion between the broadly bisinuate base and the subbasal line perfectly smooth in the middle; elytra more elongate, more parallel, much more shouldered at base, more gradually and acutely ogival with less arcuate sides posteriorly, having scarcely a trace of punctuation but with some fine and feeble sparse creases, the foveæ very small, sparse, asperulate. Length, ♀, 18.5 mm.; width, 6.9 mm. Tulare Co. (Mineral King Road, 8,000 feet) *levis*, G. H. Horn

I have seen no representative of *Xanti*, Lec.; *ambiguus*, Schpp., or *Van Dykei*, W. Horn, and so have not included them in the table; the first, from the regions back of Sta. Barbara, is said by W. Horn to be identical with *Californicus*, but this identification is somewhat involved in doubt. *Ambiguus* is said to come in the neighbourhood of *Audouini*. I have seen the type of *Horni*, Lec., but have no example; it seems certainly to be a distinct species, because of its very large prothorax, with very feebly converging sides; it is allied more closely to *Tularensis* than to *sequoiarum*. The form published by Dr. W. Horn under the name *Van Dykei* (Deutsch Ent. Zeit., 1903, p. 197) is distinct in having the elytra about as wide as the prothorax, and the pronotum finely and evenly rugose throughout; it is said to belong near *Audouini*.

The *punctifrons* group is in some respects a Sierran representative of the northern coast *Audouini* group, but there are numerous rather radical points of divergence, the most noticeable being the peculiar form of the pronotum in *Audouini*, with its deeply declivous sides, though in *borealis* this character is lacking; but this species differs greatly from either *Audouini* or *punctifrons* in its very large oblique frontal impressions,

among other features. The most obvious points of resemblance are the more acutely attenuate elytra, with coarse and irregular sculpture, and the presence of punctures on the anterior part of the front; but these punctures are also very noticeable in other types, such as *sequoiarum*. The close association of the *Audouini* and *punctifrons* groups suggested by W. Horn is therefore by no means warranted.

It might be contended that *collaris* and *compositus* of the table are the sexes of a single species, but the incongruities of the types are of a distinctly different kind from those distinguishing the sexes in any other form, and, if they should prove to belong to a single species, it will be decidedly noteworthy. It is true they come from the same locality, but the various labels which they bear would seem to show that they inhabit different stations in the vicinity of Wawona, and were probably not taken by the same collector. In my original description of *lugubris* two subspecies were included, and I here definitely adopt as the type the example alluded to as having the elytra more gradually attenuated and widest before the middle. The other specimen, although very close to typical *sequoiarum*, differs in its more elongate form, relatively smaller prothorax, and some other slight characters not determinative without further material. Still another subspecific form, represented by a single specimen, has the elytral punctures much smaller and feebler than in any other.

I notice that the name *lævis* of G. H. Horn is persistently misspelled "levis" by Dr. W. Horn.*

Cicindela, Linn.

The peculiar vestiture of the legs in *Dromochorus*, it seems to me, is a perfectly valid character distinguishing that genus from *Cicindela*, apart from the difference in general habitus; for, even in those forms of *Cicindela* having vestigial wings, such as *celeripes*, there is no tendency toward fine decumbent crural pubescence. The sculpture of the elytra is still more minute than anything that I have observed in *Cicindela*. This sculpture is wonderfully beautiful under the moderately high power of a binocular. In *C. nigrocærulea* and allied forms, for example, the ground sculpture consists of minute crowded, nearly circular pits, which, more posteriorly,

*It is true that *lævis*, with the *e* long, means smooth in the purest Latin, but, with simply a short pronunciation of the *e*, which is never indicated in ordinary print, it also signifies *light in weight*. To distinguish these two very distinct meanings, the word smooth is usually written *lævis*, the *æ* being a legitimate rendering of the long *e*, and very important to observe in naming species in order to avoid ambiguity.

become less regularly concave, and, apically, assume the form of closely crowded convexities, somewhat like the facets of a compound eye.

The form known in our cabinets as *Santaclaræ*, Bates, is a species distinct from *vulturina*. In the latter the hind body is shorter and more depressed, and the median band is very narrow, extending from the margin obliquely forward, then broken posteriorly at a right angle, extending to about apical third and inner fourth, not enlarging much. In *Santaclaræ* there is a rounded spot just before and another just behind the middle, the latter nearer inner third, the two spots joined by a very fine oblique line; it occurs with the ground colour pure green, olivaceous, bright coppery brown or smoky black. *Obsoleta* (= *prasina*) is much more elongate, and is always spotless; it is also a distinct species.

Under the *longilabris* group, Mr. Leng states that *perviridis* has the elytra more elongate and convex. The three specimens in my collection, from Placer Co., California, have the elytra narrower and relatively more elongate, though not by any means more convex, but rather more depressed, than in *longilabris*; their sculpture is notably denser and less coarse; one of them is of a decided blue green. A green California *longilabris* is similar to the normal Colorado form in sculpture, but is of a much brighter and purer green than my representatives of *perviridis*, which may therefore not be entirely typical. My single example of *montana*, Lec., is slightly smaller, shorter and stouter than the typical *longilabris*, the prothorax notably shorter, the median mark of the elytra finer and shorter, bent at right angles and the sculpture normal; it is from Alberta. I regard *montana* as, at any rate, a very well-marked subspecies of *longilabris*, if not distinct. The following is another subspecies generally confounded with *montana*:

C. Nebraskana, n. subsp.—Form very much more slender than in *longilabris*, and still more so than in *montana*, deep black throughout above and beneath; labrum similar though rather shorter, deep black throughout in the female; third antennal joint with rather stiffer external spines; head similarly concave; prothorax similar but relatively smaller, scarcely as wide as the head; elytra narrower, nearly three-fourths longer than wide, almost similarly sculptured but with the surface between the coarse and well-separated punctures much more shining, without trace of pale marking of any sort. Length, ♀, 13.0 mm.; width, 4.9 mm. Nebraska.

In the *nigrocærulea* group there are many forms, some specific and others subspecific or racial; thus far only a few of them have been

described, such as the original LeContean species, and, more lately, *rubusta* and *Bowditchi* by Leng. The following is a mountain modification of *nigrocærulea*:

C. feminalis, n. subsp.—Very deep purplish-blue, pervaded with large clouds of bluish-black, sericeous, brighter violet-blue and polished beneath, with sparse white hairs at the sides of the body and on the legs; head finely strigilate between the eyes, impunctate and nude anteriorly, the labrum finely tridenticulate, with the median tooth more prominent, pale, infumate basally and apically; labial palpi very pale (♂) or dark piceous (♀), the apical joint black; prothorax a fourth wider than long, about as wide as the head, margined laterally with a few decumbent white hairs; elytra (♂) impressed longitudinally near the suture and with an entire row of foveolæ, also a short line of the latter in the intrahumeral impression, the punctures feeble but evident, less marked apically. Length, ♂, ♀, 10.5–11.8 mm.; width, 4.2–4.8 mm. Colorado (Las Animas).

In the female the elytra are much more inflated than in the male, and their surface, instead of being uniform in its sericeous lustre throughout, as in that sex, has each a small oblique impression near the suture rather before basal third, which impression is polished and densely, deeply and very distinctly punctate; the longitudinal impression and the foveæ also are almost obsolete. This subspecies is smaller than *nigrocærulea*—12.5–14.25 mm.—and, although similar in having only a small transverse white streak at the elytral apices, apparently has the prothorax more transverse.

The following three are also modifications of *nigrocærulea*, but are more closely allied to the *robusta* type. They are all of a sericeous-green colour above, more shining deep blue beneath, with more or less green legs. They may be defined as follows,—from the male in each case:

C. Snowi, n. sp.—Rather slender, moderately convex, the general structural characters and setæ as in *nigrocærulea*; head much more coarsely strigose toward the eyes than in any other allied form; prothorax feebly obtrapezoidal, with nearly straight sides, evidently narrower than the head, and but slightly wider than long, with two close-set and rather regular series of coarse punctures near each side margin; elytra one-half longer than wide, with the usual line of foveæ but without the subsutural impression, the punctures strong, relatively rather coarse, blue in colour and somewhat lucidogranuliferous, becoming simple and subobsolete apically; each elytron has a pale spot on the humerus, another externally

at basal third, and one at the middle, a small spot at inner and just before apical third, and an entire but slender apical lunule. Length, ♂, 11.0 mm.; width, 4.2 mm. Arizona (Congress Junction).

C. triplicans, n. subsp.—Similar to *Snowi* but more elongate, with the anterior parts stouter, the head very minutely and closely strigilate between the eyes; prothorax larger, about as wide as the head, more transverse and more strongly obtrapezoidal, the punctures laterally confused, though with a single regular series near the margin; elytra more elongate, two-thirds longer than wide, with foveæ, punctures and minute granulation as in the allied forms, the punctures smaller and closer than in *Snowi*, feebler and simple, though distinct throughout each elytron, with a pale spot on the humerus, another submarginal and smaller at the middle and at the posterior arcuation, and a slender transverse spot at the apex. Length, ♂, 11.4 mm.; width, 4.2 mm. Colorado (Robinson).

C. velutoidea, n. subsp.—Rather more olivaceous-green, smoother and more depressed above than in either of the preceding; head nearly as in *triplicans*, but with the left mandible more abruptly bent and with its external curve much more narrowly rounded; prothorax nearly similar and almost as wide as the head; elytra shorter and relatively broader, one-half longer than wide, the punctures very small, feeble and much sparser, wholly obsolescent apically, each elytron more evidently impressed along the line of foveæ and with a white spot on the humerus, one at outer fourth at the middle and at inner third rather before apical third, and a complete apical lunule. Length, ♂, 10.5 mm.; width, 4.25 mm. A single example from an unrecorded locality, but probably from Colorado.

In the *sexguttata* group *patruela* is well distinguished as a species by its very dense sculpture, duller, more olivaceous-green colour and complete median band of the elytra among other characters. *Sexguttata* is of a more bluish-green and has the elytral punctures smaller and well spaced; my examples are from North Carolina to northern New York and Indiana; confused with this, but constituting a distinct species, is the following:

C. Levettei, n. sp.—General form and structure as in *sexguttata*, the maculation of the elytra similar, except that the inner post-median spot is generally subobsolete, but with the coloration of a brighter and purer green, the elytral punctures stronger and more close-set; distinguished principally, however, by the notably longer legs in both sexes. Length, ♂, ♀, 12.0–14.0 mm.; width, 4.8–5.6 mm. Iowa.

C. tridens, n. subsp.—Similar to *Levettei*, except that the elytra are more elongated and more parallel (♂) or shorter and more parallel (♀), and are either wholly immaculate or with a very small submarginal spot at the middle and a small transverse apical remnant of the larger apical spot of *Levettei*; the strigilation of the interocular part of the head is also very evidently coarser. Length, ♂, ♀, 12.8 mm.; width, 5.0–5.2 mm. Northwestern Louisiana (Vowell's Mill), to Kansas (Onaga).

The labrum in this group is very strongly tridentate, the median tooth especially prolonged and acute.

The following form would seem to be allied to *punctulata*, but it differs in so many directions as to leave its exact affinity obscure for the time being:

C. Boulderensis, n. sp.—Form somewhat as in *punctulata* but much more elongate, convex, rather dull, dark coppery-brown, slightly more cupreous anteriorly, shining, green-blue and laterally densely pubescent beneath throughout the length; head granulose, strigilate laterally, the front bald, the labrum with the narrow apical truncature minutely unidentate; prothorax but little wider than long, moderately narrowed basally, broadly rounded at the sides, the marginal line strong; surface convex, finely, strongly rugulose, punctate and sparsely pubescent laterally, the impressions moderate; elytra elongate, parallel, not obtuse at tip, the sutural angles denticulate; surface strongly, rather finely and nitidoasperately punctate, the humeral lunule represented by the basal part and a post-humeral dot, the side margin, from just before the middle to apical third, unevenly and narrowly pale, the apical lunule complete but slender; there is also a discal dot at inner and apical third. Length, ♀, 12.0 mm.; width, 4.0 mm. Colorado (Boulder Co.).

This species differs from *punctulata* in having the line of foveæ parallel to the suture very small in size and almost obsolete, and in the densely and very conspicuously pubescent sides of the abdomen.

The form which I described (Ann. N. Y. Acad., IX, p. 296) as a variety of *purpurea*, under the name *plutonica*, is in reality a distinct species, not very closely allied to *purpurea*, or, in my opinion, to any other species. Recognizing its distinctness from *purpurea*, Dr. W. Horn states that it may be a variety of *tranquebarica*; at any rate, according to that author, it must be a variety of something. The Oregon specimens referred to *plutonica* by Leng seem to have been correctly determined.

Denverensis is not a subspecies of *purpurea*, but an abundantly distinct species, having the labial palpi basally pale, and not wholly black.

The Utah species, *C. echo*, Csy., occurs also at Amedee, Cal., in a form differing only in its larger size, stouter build and evidently larger head; this form can, however, be recognized as differing from the Utah types and may be named *Amadeensis* (n. subsp.). Length, ♀, 12.5 mm.; width, 5.2 mm. *Pseudosenilis*, W. Horn, is a very evident subspecies, occurring in Inyo Co., Cal. *Echo* is an isolated species, and not a subspecies of *Willistoni* as stated by W. Horn, differing in its minute labral tooth, sculpture and form of the maculation, among other features. *Depressula* is also an evidently valid species, and not a subspecies of *Oregona* as intimated by W. Horn.

The following is a subspecies of *depressula*:

C. scapularis, n. subsp.—Form stouter than in *depressula* and even more strongly depressed, almost similar in coloration, though rather darker and more obscure in the type, similar in sculpture and in its bald strigilate front, but with the elytral punctures still coarser, deeper, denser and more strongly nitidoasperate; labrum (♂) differing noticeably from that of the male of *depressula*, being piceous and not straw-yellow, and with the apex medially, not evenly arcuate with a minute, prominent median tooth, but approximately and feebly bilobed, the lobes separated by a small acute tooth that does not project beyond them; basal joint of the antennæ rather more inflated; prothorax larger, fully as wide as the head, two-fifths wider than long, obtrapezoidal, with the sides perfectly straight throughout; elytra with a well-developed pale spot on the humerus, the others nearly as in *depressula*, except that the apical is larger and more prolonged; under surface not green as in *depressula*, but deep violaceous-blue, hairy toward the sides. Length, ♂, 13.5 mm.; width, 5.3 mm. California.

This subspecies is very well differentiated and may prove to have higher taxonomic value; it somewhat resembles *Sierra*, Leng, in form and outline, but lacks any trace of the frontal punctures and pubescence of that species.

A form of *senilis*, differing in sculpture, form of the humeral lunule and other characters, is the following:

C. exoleta, n. subsp.—Moderately stout and convex, shining, the elytra duller, cupreous, with blue spots and transverse impressions anteriorly, the elytral punctures blue, the lateral border greenish; under surface blue-green; head nearly as in *senilis*, the labrum similarly with large discal punctures; prothorax obtrapezoidal, with straighter sides, the

surface more coarsely micro-rugulose, and the marginal raised border better marked; elytra with the humeral lunule not entire and of equal width throughout as in *senilis*, but widely divided, the posterior part more inflated; median band similarly ascending to the median line, more dilated inwardly and posteriorly, with its external part tapering to a narrow point of origin at some distance from the sides, and not more or less expanded along the latter as it is in *senilis*; apical lunule divided; under surface densely pubescent laterally throughout. Length, ♀, 12.5 mm.; width, 5.0 mm. California (Oakland).

In *senilis* the colour is obscure and blackish, with the sculpture of the pronotum extremely fine and dense and more vermiculate. My specimen of *senilis* I know to be authentic, but it is simply labeled "California."

A species which I cannot place very accurately at present may be defined as follows; it resembles *lunalonga* somewhat in general marking, but has the front densely pubescent:

C. diffracta, n. sp.—Rather narrow and convex in form, somewhat shining, the elytra duller; coloration as in the preceding, but brighter and with the elytra not margined with paler tint; under surface blue-green, with large cupreous areas anteriorly, the sides of the prosternum with very long dense white hair, the sides thence to the apex with fine and sparser decumbent hair; head finely strigilate, the front with long, dense, coarse, pale hairs, the labrum minutely, equally tridentate; prothorax narrower than the head, wider than long, obtrapezoidal, well impressed, scarcely pubescent laterally; elytra parallel, broadly rounded behind, finely, not closely, subequally and nitidosubasperately punctate throughout, without a line of foveæ, the humeral lunule extending to the middle of the length at inner two-fifths, subequal throughout, but irregularly disintegrated, the median band transverse, approaching the humeral lunule very closely, then bent posteriorly, for an equal distance, finely disintegrated throughout, the apical lunule large, entire, not disintegrated. Length, ♂, 11.0 mm.; width, 4.15 mm. New Mexico (Las Vegas).

In *lunalonga* and others with which this may be supposed to be allied, the front is bald.

The following species was distributed extensively by Prof. Snow and others under the name *pimeriana*, Lec. It evidently cannot be in any way closely related to that species, however, but in the system of Mr. Leng

would seem to approach the Group H, defined by him (Tr. Am. Ent. Soc., 1902, p. 116):

C. Cochisensis, n. sp.—Moderately slender, rather convex, strongly shining, bluish-green to wholly or in part deep cobalt-blue throughout; head not very finely strigilate, the frontal swelling closely punctate and with stifferect white setæ; labrum pale, with the apical and basal margins narrowly piceous, the apex approximately bilobed, with a short and broadly angulate median tooth not projecting beyond them (♂), or more evenly arcuate, with a more prominent median tooth (♀); prothorax a little narrower than the head and slightly wider than long, narrowed basally, the sides broadly rounded; surface convex, deeply impressed, polished and only feebly wrinkled, with a very few coarse white lateral hairs, the sides margined; elytra parallel, more than one-half longer than wide, wholly immaculate, with rather strong and well-separated simple punctures, which are only slightly smaller apically; under surface with numerous long coarse white erect hairs laterally on the propleura, much shorter, white, and subdecumbent but numerous along the sides of the abdomen; anterior tarsi (♂) very narrowly dilated; hind tarsi but little longer than the tibiae. Length, ♂, ♀, 10.7–11.8 mm.; width, 4.0–4.7 mm. Arizona (Douglas).

I am unable to identify this with any Mexican species, and assume that it is quite local in the southern part of Cochise Co., Arizona.

The three following very small forms were collected by Mr. C. H. T. Townsend at Colonia Garcia, Sierra Madre Mts., Mexico, and have a common type of organization, with feeble and subobsolete sculpture; they are wholly glabrous throughout on the under surface:

C. flitarsis, n. sp.—Slender, moderately convex, alutaceous, dark greenish-blue above, more violaceous beneath; head almost even, finely strigose except along the middle, the front bald, the slope smooth; labrum sinuously oblique at each side of the frontal margin, the median advanced part obtusely trilobed and but little more than half the total width; prothorax small, slightly narrowed basally, rounded on the sides and distinctly wider than long, the marginal line indistinct, the surface convex, very finely, feebly sculptured, the anterior impression very feeble; elytra parallel, not very obtuse at apex, the sutural angles not modified, the surface wholly immaculate, finely, not very densely, subevenly but very feebly punctate; tarsi long and very slender. Length, ♂, 8.5 mm.; width, 3.1 mm. Mexico (Chihuahua).

C. tumidifrons, n. subsp.—Similar in general to the preceding but more shining, green above, blue and green beneath; head more broadly granulose along the middle, the front transversely and abruptly elevated above the vertex, with the median part of the anterior slope smooth and minutely, sparsely punctulate; labrum similar, except that the feebly trilobed advanced part is fully two-thirds the total width; prothorax much less transverse and with less rounded sides, only just visibly wider than long, the lateral marginal line much more evident and the anterior transverse impression deeper; elytra and tarsi nearly similar throughout. Length, ♂, 9.5 mm.; width, 3.6 mm. Mexico (Chihuahua).

C. aterrima, n. sp.—General organization as in the two preceding but much more elongate, alutaceous, deep black above and beneath, the latter shining; legs deep black, not at all metallic; head finely strigilate almost throughout, subeven, the front feebly swollen as usual, bald; labrum as in *flitarsis*, but with the median trilobed projection a little wider; prothorax wider than long, obtrapezoidal, with nearly straight sides, having a very few short hairs laterally, the marginal line subobsolete, the impressions rather feeble; elytra parallel, similar but much more elongate, immaculate and with the punctures almost obsolete; tarsi not quite so slender. Length, ♂, 10.0 mm.; width, 3.75 mm. Mexico (Chihuahua).

Although *aterrima* is of the same general type as the two preceding forms, it would be a rather remarkable and very instructive fact if its status should prove to be anything less than specific.

CARABIDÆ.

Omophron, Latr.

The following are a few species and subspecies which have been undescribed in my cabinet for some years:

O. grossum, n. sp.—Body very large and stout, moderately convex and shining; head throughout and mandibles pale, the latter black apically, the clypeal suture finely infumate, a small transverse piceous cloud on the vertex basally; surface wholly impunctate, except a few punctures scattered along the base; antennæ slender; prothorax but slightly more than twice as wide as long, the sides more parallel than usual and very discontinuous with those of the elytra, gradually rounding and feebly converging anteriorly, the surface with a central green parallelogram in median two-fifths, narrowly prolonged medially to the

apex, but only slightly irregular basally, without lateral spots, the punctures strong and close-set basally and apically, virtually wanting medially from side to side; elytra but little longer than wide, inflated basally, where they are fully a fourth wider than the prothorax, each with fifteen coarse and deeply impressed striæ, which are only moderately coarsely but very closely punctate, the green metallic spots less developed than in *tessellatum*, the sutural interval evenly dark to within a short distance of the apex, where it fades; outer spot of the second row resolved into two small elongate dashes, the third row resolved into five elongate spots; under surface blackish-brown, the abdomen paler. Length, 8.5 mm.; width, 5.2 mm. Texas.

This is by far the largest species of the genus known to me.

O. ellipticum, n. subsp.—Similar to *tessellatum* throughout but larger and more elongate, the elytra of a more pointed ogival outline behind; head similar in coloration and sculpture, except that the few basal punctures are finer; prothorax much less abbreviated, but little, though obviously, more than twice as wide as its median length, similar in colour and sculpture, except that the punctures are much finer; elytra similar in general form and sculpture but less abbreviated, the sutural dark vitta not enlarged before the apex, but gradually disappearing without the least dilatation near the tip; outer reniform spot of the second row almost divided; outer part of the third row resolved into a long and a short dash. Length, 7.0 mm.; width, 4.3 mm. Rhode Island.

Very closely allied to the more western *tessellatum*, and probably more in the nature of a subspecies; the comparisons are drawn from the female in each instance.

O. brevipenne, n. sp.—Form and sculpture nearly as in *robustum*, Horn, but differing in maculation and in its smaller size; head pale, the base throughout the width, and extending narrowly along the eyes to their middle and with two obtuse median spurs, metallic-green, the green areas alone punctate, the punctures moderate; prothorax fully two and one-half times as wide as long, strongly trapezoidal, with evenly-arcuate sides almost continuing the sides of the elytra, having, rather behind the middle, a large transverse medial and at each side a small green spot, the former broadly continued to the apex, also continued almost or quite to the base at each of its ends and in the middle, the punctures strong and close-set

basally and apically, with a few scattered between the central and each lateral spot; elytra rather shorter than wide, almost evenly rounded, not much inflated basally, each with fourteen fine and feebly impressed striæ bearing coarse and widely-separated punctures, becoming smaller but still distinct apically, the common entire sutural green vitta strongly dilated before the apex into a transversely rhomboidal spot; each elytron also with one subscutellar and three well-developed subhumeral green spots at base, the second row as in *tessellatum*, but with the two large spots more rounded, the third band nearly as in that species, but less irregular and broadening much more suturally, there joining the second row and also the subapical rhomboid. Length, 6.0 mm.; width, 4.6 mm. Ohio.

Robustum, from the more boreal Nova Scotia region, is much less maculate than *brevipenne*, and is said to more nearly resemble *gilæ* in that respect; the sutural dark vitta wholly disappears behind the third row, and is not expanded into a spot, the latter being greatly developed in the present species, which usually bears the name *robustum* in collections. The dark metallic-green coloration prevails in *brevipenne*, but is much less in area than the pale regions in *robustum*.

Blethisa, Bon.

B. Columbica, n. sp.—Form nearly as in *multipunctata*, but larger and less metallic, deep black, polished, with very feeble violaceous lustre, more greenish-æneous in the marginal gutters of the elytra; head nearly as in *multipunctata*, but larger and with much stouter antennæ; prothorax as in that species, but less punctate in the lateral gutters; elytra more oval and less parallel-sided, with somewhat uneven but distinct, rather coarse and distinctly punctate striæ, the foveæ much smaller, about five on the third and two or three on the fifth interval; side piece of the prosternum with small but evident punctures, becoming obsolete anteriorly; anterior male tarsi rather more elongate. Length, ♂, 11.0 mm.; width, 4.4 mm. British Columbia.

Differs from *multipunctata* as stated above, and from *Oregona* in its smaller size and partially punctate sides of the prosternum.

Pseudomorpha, Kirby.

The species of this genus are as active in flight as *Cicindela*, and are rather difficult to capture; for this reason they may not be actually so rare as might be assumed.

P. castanea, n. sp.—Body parallel, moderately and evenly convex, rather stout in build, strongly shining, with a feebly alutaceous or sub-opalescent lustre, very dark blackish-castaneous above, less dark and more rufo-castaneous beneath; head large, transversely trapezoidal, smooth, with a few very fine scattered pubiferous punctures toward the base of the vertex, the occiput smooth; prothorax fully twice as wide as long, feebly trapezoidal, with almost evenly and moderately arcuate sides; apex and base truncate, the latter arcuate laterally, the basal angles rounded; surface sparsely punctate throughout, very finely medially, less so and more asperately laterally, the punctures medially bearing very short erect stiff hairs, becoming longer but still very short laterally, the sides explanate, concave except basally; scutellum polished, transversely triangular; elytra one-half longer than wide, not quite as wide as the prothorax, the sides straight and parallel, broadly rounding at the humeri and becoming feebly convergent in less than apical third to the broadly-rounded external angles, the apex broadly arcuate-truncate, the sutural angles rounded; surface evenly convex, each with nine even unimpressed series of small asperate punctures bearing stiff erect setæ, the punctures subequal throughout, except the ninth and a partial tenth series on the flanks, which are very minute and barely traceable; there is also a partial basal series between the first and second; fine, acute lateral margins with a series of close-set asperate setigerous punctures on and not within the edge itself; first abdominal suture abruptly arcuate at the middle, the second segment, and, to a less degree, the third and fourth finely and closely punctate, and with short decumbent fulvous pubescence except laterally, and also with a single irregular transverse series of fine close setigerous punctures. Length, 9.8 mm.; width, 4.0 mm. Utah (Stockton).

This species may be placed near the Arizonian *angustata*, Horn,—printed in table, text and over the original description "*angustata*"; but presumably *angustata* is meant. It differs, however, in the absence of any indication of the subsutural row of larger punctures characterizing that species and in its decidedly larger size.

LUCANIDÆ.

Dorcus, MacL.

The following appears to be a form worthy of a name, though closely related to *parallelus*:

D. nanus, n. subsp.—Similar in form, coloration and general structure to *parallelus*, but very much smaller and differing (♂), in having the head

coarsely and closely punctate throughout, except in a small patch above each eye and on the occiput, the pronotum not abruptly coarsely punctate near the sides as in that species, but with the coarse punctures extending inwardly broadly, becoming very gradually smaller medially; the elytral sulci are deeper, more close-set and more evenly spaced, the sulci throughout as wide as the intervals or nearly so; differing (♀) in its much smaller size, narrower form and in the deeper, more close-set and more evenly-spaced elytral sulci; the tarsal claws are decidedly smaller in both sexes. Length, 16.0 mm.; width, 6.6–7.0 mm. Two specimens from the Levette cabinet, probably collected in Indiana.

Platycerus, Geoff.

Cærulescens, of LeConte, is a species from southern California that has been wholly lost sight of in recent years, and probably considered a synonym of *Oregonensis*. That it is a synonym of that species seems improbable, however, as the basal angles of the male prothorax are said to be obtuse but not at all rounded; they are distinctly rounded in *Oregonensis*, and the localities are very different. I would be inclined to regard *chalybeus* as synonymous with *cærulescens*, were it not for the facts that it is very much smaller in size and has the basal angles of the male prothorax slightly prominent, subverted and right to slightly acute.

The forms allied to *quercus* are difficult to define satisfactorily, but I note a number of very evident modifications of that type, some of which are probably specific in value. *Quercus*, occurring abundantly in Indiana, is a small species, the male narrow, parallel, with the head only moderately coarsely or closely punctate, the prothorax scarcely more than one-half wider than long, the sides converging anteriorly more or less from the angulation near basal third, with the side margins but narrowly reflexed, the punctures close-set but only moderately coarse; the elytra three-fifths longer than wide, only moderately coarsely punctate to somewhat finely so and obscurely punctato-striate. The female is larger, more convex, more coarsely sculptured, paler and more æneous in lustre and with the prothorax less transverse and more narrowed anteriorly. The length and width of five males before me, including the mandibles, are 8.0–10.0 by 2.9–3.5 mm.; the corresponding dimensions of six females being 8.0–10.0 by 3.0–4.1 mm. The following are two modifications of this type, which, to be on the safe side, I will call subspecies for the present; they are described from the male:

P. angustus, n. subsp.—Still narrower and rather more depressed than *quercus*, the head more coarsely and closely cribrate; prothorax one-half wider than long, the sides parallel, arcuately rounding near the apex and somewhat abruptly converging in about basal third, the basal angles obtuse and narrowly rounded; surface punctured as in *quercus*, but with the side margins twice as broadly reflexed, this being a very conspicuous character; elytra still more coarsely sculptured than in *quercus* and more obscurely striate. Length, ♂, 8.7 mm.; width, 2.75 mm. A single specimen from the Levette cabinet, probably collected in Colorado.

P. Iowanus, n. subsp.—Nearly similar to *quercus* but smaller, more abbreviated and of a deeper and more polished, more greenish-black colour; mandibles, when fully developed, shorter, more prominent externally near the base and with a deeper external sinus, the head more coarsely and densely cribrate; prothorax nearly as in *quercus* but more transverse, being three-fourths wider than long and more densely, somewhat more coarsely punctate; elytra shorter, not more than one-half longer than wide, coarsely, deeply and closely punctate, and with impressed striæ more or less lost externally; the female differs from the male in the same general direction as in *quercus*, but the colour is deep greenish black, and not paler and more æneous, though the legs and abdomen are pale rufous, a character wholly wanting in the male; the elytra are relatively more elongate and the prothorax shorter than in the female of *quercus*. Length, ♂, ♀, 8.5–9.0 mm.; width, 3.0–3.35 mm. Iowa (Keokuk).

The following is apparently specifically different from *quercus*:

P. peregrinus, n. sp.—Larger and rather stouter than *quercus*, moderately shining, black above and beneath, the elytra somewhat ænescent; head strongly, unevenly and, on the whole, not very closely punctate, the fully-developed mandibles longer, less bent and less prominent basally than in *quercus*, the antennæ nearly similar, though with the last joint less oblique; prothorax two-thirds wider than long, the sides converging and perfectly straight from the obtuse angulation at basal third to the apex, converging basally, the angles obtuse and blunt; surface punctured as in *quercus*, the side margins very narrowly reflexed; elytra nearly as in *quercus*, except that the punctures are coarser, more rounded and less lineiform. Length, ♂, 11.5 mm.; width, 3.8 mm. Oregon.

Differs from *quercus* principally in its larger size, obtusely rounded basal angles of the prothorax, coarser sculpture, form of the fully developed mandibles and other characters.

SCARABÆIDÆ.

Cænonycha, Horn.

The following is an insular form with vestigial wings :

C. clementina, n. sp.—Form narrowly oblong, convex, dilated posteriorly, reddish-brown, alutaceous, the female larger, paler and more shining ; head densely but rather superficially punctate, more deeply on the vertex and more evidently in the female, the clypeus reflexed at apex, prominently dentate at each angle, sinuato-truncate between the angles ; prothorax very nearly twice as wide as long, widest behind the middle, the sides strongly rounded, converging and straight anteriorly, the basal angles obsolete, very broadly and evenly rounded ; surface finely but strongly, evenly and not very closely punctate, and with short inconspicuous hairs ; elytra about one-half longer than wide, or a little more (♀), finely, evenly and rather loosely punctate and with very short hairs, each with two or three fine and very feeble raised lines ; both claws of all the tarsi finely and very minutely bifid at tip, the female similar in this respect, but with the claws even more minutely or unequally bifid. Length, ♂, ♀, 8.0–9.3 mm.; width, 4.1–5.0 mm. Island of San Clemente. Five males and two females.

There are a few very stiff erect setæ along the side margins of the prothorax, and also just behind the elytral humeri. This species differs from *socialis*, Horn, an inhabitant of Guadalupe Island, in its smaller size and absence of sinuation in the sides of the prothorax toward the prominent apical angles ; this sinus is, however, feebly evident in the female. Dr. Horn states that the antennæ in *socialis* are 9-jointed ; the antennæ in both sexes of the present species are very plainly 10-jointed, and I am disposed, therefore, to doubt the accuracy of the statement referred to (Tr. Am. Ent. Soc., 1876, p. 192). The mandibles are bifid at tip, the inner lobe also very feebly bifid.

Phobetus, Lec.

I do not know that a very singular character of this genus has been hitherto noticed ; the middle tibiæ of all my specimens, and possibly therefore in both sexes, have a small reflexed uncus on the inner side of the apex. The antennæ in all of the nine examples at present before me consist of nine joints, which it might be inferred is constant in both sexes, though the male and female seem to be not readily differentiated, unless my material is all of one sex, which is somewhat improbable. The

following is allied rather closely to *comatus*, but is a larger and differently coloured species :

P. centralis, n. sp.—Stouter than *comatus*, highly polished, pale luteo-flavate, the head dusky except anteriorly, the pronotum with a large central piceous cloud, and the elytra more or less piceous along the suture and side margins ; pubescence long and dense beneath, long but sparse on the pronotum anteriorly and at the base of the elytra, the lateral fimbriæ long and dense ; head less coarsely punctate ; prothorax with more numerous coarse punctures anteriorly, and with the fine punctures more distinct ; elytra feebly but inconstantly sculptured, with the three or four double lines frequently wholly obsolete. Length, 14.5–16.0 mm.; width, 7.5–8.2 mm. California (Kaweah, Tulare Co., 1,000 feet).

Comatus is more northern in habitat, being abundant in the regions about Sacramento. *Testaceus*, of LeConte, from the Island of Sta. Cruz (Proc. Acad. Phila., VI, p. 346), is probably, at any rate, a well-marked subspecies of *comatus*, and should be continued in our lists as such ; the antennæ are described as 10-jointed in the male, but, according to that author, they are 9-jointed in the female. So possibly all my specimens are females. The subject would seem to be worthy of renewed study by those having more ample material.

Dyscinetus, Harold.

The following is much larger and stouter than *trachypygus*, Burm.:

D. puncticauda, n. sp.—General characters as in *trachypygus* but more finely and sparsely sculptured, black, polished ; head similar, but with the clypeus not finely and sparsely punctured but coarsely, though superficially and confluent, punctato-rugose ; prothorax rather more transverse, finely and very sparsely punctate ; elytra similar, but with the double series of punctures scarcely at all impressed ; pygidium (♂) highly polished, coarsely and sparsely punctured throughout, the punctures becoming close and irregularly confused near the lateral angles. Length, ♂, 18.5–20.0 mm.; width, 9.0–10.7 mm. Kansas (Hamilton Co.), F. H. Snow.

The sculpture of the pygidium differs entirely from that of *trachypygus*, but resembles that of the West Indian *picipes*, Burm., which is said to occur also in Mexico by Bates. I am inclined, however, to think that Bates had the present species before him, or one closely allied, and not the true *picipes*, as the legs in *puncticauda* are black or concolorous, and the anterior margin of the clypeus, though broadly sinuous, could not by

any means be described as "zweizackig." Burmeister, moreover, states of *picipes* that the hind coxæ, as well as the pygidium, are coarsely punctured; the hind coxæ here are finely, very sparsely punctured; the length given for *picipes* is 8-9 lines, or 16-18 mm. Bates states that, in the Mexican representatives, the inner small spur of the divided apex of the broad claw of the anterior male tarsus is divergent; it could scarcely be termed divergent in the present species, as it is virtually continuous in direction with the side margin of the claw.

Ligyris, Burm.

L. Californicus, n. sp.—Much larger, stouter and more polished than *gibbosus*, and with shallower sculpture, castaneo-rufous; head finely, densely punctato-rugose, with the transverse carina strong, acute and straight; prothorax with the usual apical indentation and short acute tubercle, the punctures strong and rather numerous; elytra with the series of small punctures scarcely impressed. Length, 15.0-16.5 mm.; width, 9.2-10.0 mm. Southern California.

Differs from *gibbosus* in its larger size and stouter build, smoother surface, and especially in the much more dilated posterior tibæ.

L. spissipes, n. sp.—Form nearly as in the last but less robust and more coarsely and deeply sculptured, similar in colour; head less finely and not so densely punctato-rugose, the carina more noticeably depressed medially, particularly in the male; prothorax more abbreviated, the punctures similarly coarse but not quite so numerous, decidedly sparse; elytra with the striæ of coarser punctures evidently impressed. Length, 12.2-15.0 mm.; width, 7.9-9.2 mm. New Mexico.

This species is also distinguished from *gibbosus* by the short and very rapidly and broadly dilated hind tibæ.

L. rugiceps, Lec., belongs to the genus *Eutheola*, of Bates.

Valgus, Scriba.

V. minutus, n. sp.—Similar in general form to *squamiger*, but very much smaller and with different vestiture; red-brown in colour, moderately shining; head with erect scales, dense posteriorly, very much finer and sparser anteriorly; prothorax as long as wide, narrowed anteriorly, with semi-erect scales, coarse and dense laterally toward base and on the two elevated ridges, fine and sparser elsewhere; elytra with rather uneven approximate series of small rounded tubercles, which are very close-set, each with a minute central puncture from which proceeds a slender sub-erect scale, the scales of the series directed outwardly; female with the

corneous process of the pygidium rather rapidly pointed and about half as long as the elytra. Length, 3.9-4.2 mm.; width, 2.0-2.25 mm. Louisiana (Vowell's Mill), C. W. Leng.

This is one of the more minute of the *Scarabæidæ*.

Roplisa, n. gen.

This genus resembles *Trigonopeltastes* in external facies, but is well distinguished by its 9-jointed antennæ, these organs being plainly 10-jointed in both sexes of *Trigonopeltastes delta*. The body is more narrowly elongate-oval, similarly rather flattened above and with the elytra more irregularly, and in part obsoletely, striate. The head is smaller, the eyes much less developed and the tarsi are very much shorter, the posterior being not longer than the tibiæ, with the claws much smaller. The type may be described as follows:

R. floridana, n. sp.—Dark brownish-testaceous throughout, the elytra clouded with a darker tint, the head except anteriorly and the pronotum black and shining, the elytra opaque; head finely, densely punctato-rugose, the clypeus parallel and rounded at the sides, nearly as long as wide, the angles broadly rounded, the median part of the apex slightly sinuate; eyes small, not prominent; antennæ short, the club oval; prothorax twice as wide as the head, slightly wider than long, somewhat wider before the middle than at base, the sides rapidly converging anteriorly; surface glabrous, strongly, sparsely punctate, deeply impressed and with dense yellow indument along all the margins, broadening near the basal angles, and also in two nearly straight oblique fossæ from near the margin before the middle to near the median line at basal fourth; scutellum well developed, as long as wide, with pale indument; elytra rather longer than wide, broadly arcuate at the sides, slightly wider than the prothorax, the yellow indument present in a short transverse depression slightly behind the scutellum, extending anteriorly along the suture to the latter; striæ near the suture entire and abruptly scratch-like, very fine but somewhat depressed; pygidium vertical, large, closely, finely, biobliquely rugulose, with indument laterally and basally; anterior tibiæ with a single short, broad, angular external tooth only slightly beyond the middle, the apex acute but only moderately everted. Length, 7.0-8.4 mm.; width, 3.3-4.0 mm. Florida.

The two type specimens differ much in size, but are of undetermined sex; the anterior tibiæ are similar in each.

NOTES ON PACHYBRACHYS AND DESCRIPTIONS OF NEW SPECIES.

BY FRED. C. BOWDITCH, BROOKLINE, MASS.

(Continued from page 244.)

Pachybrachys marginipennis, nov. sp.—The size and general colour of *livens*, Lec., dull yellow, elytra with very narrow dark edging, and with brown or livid punctures, largely diffuse. Length, $1\frac{1}{2}$ – $2\frac{1}{2}$ mm.

Head flat, yellowish, moderately punctured, more thickly on the darker marks in the middle and on the vertex; eyes moderately distant (much nearer than *cælatus*), nearer in ♂; antennæ of ♂ reaching a trifle beyond the middle of the abdomen, of ♀ to beyond the hind coxæ; five or six basal joints colour of head, rest dark brown, thorax somewhat tubularly narrowed in front and slightly constricted behind, broad, depressed in front of scutellum, colour same as the head, with the basal part of the standard M very indistinctly suffused in livid; in its most distinct form it is three poorly-defined spots at the base, from that form it passes to where the livid colour may be almost generally suffused; sides of thorax subangulate, especially noticeable in ♀, slightly sinuate towards the rear in ♂, hind angles very sharp, fine and nearly rectangular; elytra parallel, roller-shaped, finely and diffusely punctured, the punctures towards the sides and rear arranged in lines so as to give the appearance of flat intervals at the sides and on the convexity. The third, fifth and humeral intervals are the most noticeable, the suture and lateral edge is very narrowly black, the latter sometimes broken; lobe moderate, with a fine row of marginal punctures on the curve, marginal striæ with a very moderate curve; below dark brown, epimera, sides of abdomen and last ventral segments colour of elytra; sometimes this yellow embraces the metasternum and nearly all the abdomen, leaving only a brown marking on the side of the metasternum, and the rest of the surface with more or less livid clouds, with darker clouds on thighs; the yellow of the pygidium is complete except that central and two side spots are darker.

Three ♂'s, two ♀'s, San Diego, California. Type coll., Bowditch.

Livens, Lec., differs from this species by the absence of a dark margin to the elytra, and in having a well-defined median livid cloud on the thorax; the eyes in *livens* are also more distant. *Cælatus*, Lec., has more distant eyes and a well-marked shield.

Pachybrachys punctatus, nov. sp.—Same general form and colour as *livens*, Lec., but much larger; dull yellow, with livid marks on thorax, and livid-coloured, mostly diffused punctures on elytra. Length, 2 – $2\frac{1}{2}$ mm.

August, 1909

Head rather large, flat, moderately coarsely and thickly punctured, especially so on the livid frontal mark and vertex; eyes distant in both sexes, slightly nearer in ♂; antennæ yellow, darker after about the fifth joint, reaching a little beyond the hind coxæ in ♂, shorter in ♀; thorax yellow, broad, tubularly-narrowed in front and slightly constricted behind; standard M in livid clouds, but very diffuse, the central one somewhat following the *livens* pattern, finely punctured; more closely in livid marks; edge subangulate, in some ♀ specimens slightly sinuate in rear; hind angles sharply obtuse; elytra of the form of *livens*, but yellow, with suture narrowly black; everywhere, except the rear of the convexity and apex, diffusely punctate, with here and there traces of the third, fifth and humeral spaces; punctures more crowded in scutellar area, and sometimes a few traces of brown on the inside standard spots. There is also a suggestion in some examples of an elytral shield; lobe medium, very gradually narrowed behind, with a small row of punctures on the curve, below with legs pale, with livid clouds; the epimera, sides of abdomen and pygidium being picked out with paler colour; the top of the back, which is black, is apt to show behind the elytra in the ♀, and forms a dark middle and two side spots to the pygidium.

Five ♀'s, 1 ♂, San Bernardino Mts.; 2 ♀'s, Independence, California. Type coll., Bowditch.

Very close to *livens*, Lec., but larger, and the punctuation of the elytra not nearly as regular, and lacks the smooth, shiny look of *livens*.

Pachybrachys Arizonensis, nov. sp.—Size rather large, elongate, parallel, pale or reddish-yellow, with livid punctures and a faint general livid colour. Length, $2\frac{3}{4}$ – $3\frac{1}{2}$ mm.

Head yellow, with livid frontal line and vertex, most prominent in ♀; eyes moderately distant, a trifle nearer in ♂ than ♀; punctures thick, fine, crowded in the livid marks; antennæ yellow, very gradually and slightly darker towards the end, reaching beyond the hind coxæ in ♂, not quite so long in ♀; thorax broader than long, yellow, with standard M very lightly suffused in livid, but amount of colour varying considerably, lightly and finely punctured, but more thickly in livid markings; edge very lightly subangulate in ♂, considerably more pronounced in ♀; hind angles sharp, finely obtuse; elytra elongate, parallel, the three standard intervals pretty regularly defined, also the other intervals on the convexity; punctures fine, same as thorax, here and there in other places than as above stated, arranged in lines, but always more or less broken and irregular, and more so in ♀ than ♂, and showing sometimes a biseriate

tendency at the base; apex in both sexes smooth, except for marginal stria, which is barely sinuate behind the lobe, the latter is well developed, especially in the ♀, and almost without punctures; below pallid with sericeous pubescence; legs pale, ♀ fossa deep and well marked.

Two ♂'s, 3 ♀'s, Prescott, Arizona; 4 ♀'s, Douglas Co., Kansas. Type coll., Bowditch.

Very similar to *punctatus*, nov. sp., but the general form is more elongate parallel and not as stout; the antennæ are not so dark, nor do any of my specimens show a black sutural margin, as is the case in *punctatus*; the ♂'s in *Arizonensis* show these features best and are more pallid.

Pachybrachys Balsas, n. sp.—Body above and legs bright yellow, below, except the thorax, black. Length, $2\frac{1}{4}$ – $3\frac{3}{4}$ mm.

Head finely punctured with frontal dark mark, eyes of ♂ approximated, more than ♀, antennæ of ♂ reaching nearly the middle of abdomen, of ♀ to hind coxa, yellow for five or six joints, then becoming darker; thorax somewhat narrowed in front, finely and diffusely punctate, with deep depression in rear, and a slightly depressed and discoloured spot on either side, there being a similar discolouration touching the depression before the scutel; elytra with the first stria consisting of twelve or fifteen fine punctures irregular, also two or three of the striæ behind the humerus slightly irregular, all of the others regular; unicolourous, so that the general appearance of the species at first sight is yellow, regularly striate; none of my specimens have any cloud of colour; marginal stria straight after passing the humeral curve, lobe small, gradually narrowed behind, with a small row of well-marked marginal punctures on the curve; legs yellow, with whitish clouds on the thighs, head and thorax below and epimera are yellow or rufous, the remainder of the body is plain dull black, covered with scanty, whitish pubescence.

Rio Balsas Guerrero, Mexico, two ♂'s, three ♀'s, Wickham collector. Type coll., Bowditch.

The bright yellow upper and black under side readily identify this form. It would, by form and sculpture, be placed near *Xanthias*, Suff.

Pachybrachys Peckii, nov. sp.—Small, size of *conformis*, Dej., or *minutus*, Jac. General colour yellow, with three dark longitudinal stripes on the prothorax and fairly regular stria of black punctures on elytra. Length, $1\frac{3}{4}$ – $2\frac{1}{2}$ mm.

Head yellow, flat, finely punctured, sparsely on the yellow portions, with an uncommonly wide dark frontal mark, forked in front and connected

with spot at vertex; eyes distant, very narrowly margined with black; antennæ dark, with basal joints paler (two or three in mature specimens), reaching to about hind coxa in ♂, shorter in ♀; thorax narrowed towards the front, yellow, closely punctate, especially on dark parts, the M taking the form of three longitudinal dark stripes, the side one sometimes enclosing a small yellow spot, and the central one a median yellow line not reaching the rear, all three stripes usually reach the rear margin, though sometimes the side ones do so only partially, the transverse depression well marked at the ends of the side stripes; the lateral yellow margin is wider and almost smooth, the edge is almost straight in ♂, slightly curved in ♀; elytra yellow, with almost regular striae of black punctures, slightly confused in the vicinity of the scutel, and the punctures so disposed as to show a biseriate tendency, the fifth and sixth rows joined just before the convexity, next pair a little longer, and last pair still longer. This gives the effect of having the fourth interval open to the tip; suture narrowly black, also a black stripe covering the humeral interval and running from the humerus nearly to tip, the rear end sometimes broken or diffused; marginal stria well curved at lobe, then straight, lobe well developed, with a fine row of black punctures on the curve, the pale part of the lobe widest in front; below black, with yellow epimera and sides of abdomen, the last segment and pygidium yellow, with central dark line, legs yellow, with more or less darker clouds. Comes near *minutus*, Jac.

Three ♂'s, 4 ♀'s, Manatee Dist., Brit. Honduras, Peck. Type coll., Bowditch.

Pachybrachys signatus, nov. sp.—Medium size, shining, form of *livens*, Lec.; colour whitish-yellow with black markings, which are quite variable; the typical form has on the thorax a black median mark, divided in front, similar in shape to the thoracic mark on *livens*, Lec.; the elytra have in front a black U-shaped mark with the arms resting about the middle of the base and crossing the suture just before the shield, also the rear standard spots are diffused so as to form a transverse band; these markings vary, as subsequently stated. Length 2-2½ mm.

Head light yellow, flat, with a dark frontal and vertex mark and moderately punctured, eyes distant, antennæ yellow, thorax much wider than long, somewhat narrowed in front, rather thickly and evenly punctured, transverse depression well marked before the scutel, sides subangulate in ♀, very lightly in ♂; in addition to the black mark mentioned above, there are indications of the two side M arms, and in one example the thorax is quite suffused with black, hind angles obtuse, elytra with the

scutellar area overrunning into and including the third or fourth interval and back to a point just over the convexity diffusely punctate; there is also a slight disturbance about the seventh interval at the side, the remainder is regularly punctate striate and usually a moderately well-defined shield, marginal stria very lightly curved at humerus and almost straight behind, lobe small, black, edged with a row of marginal punctures; body below dark, with the epimera, abdomen and pygidium more or less picked out in yellow or livid, the ♀'s more so than the ♂'s; legs yellow, with indefinite lighter spots on thighs.

Prescott, Arizona, 2 ♂'s, 3 ♀'s. Type coll., Bowditch.

I also refer to this species three specimens from Provo, Utah, which are somewhat larger than the foregoing and with the elytral U-mark obsolete or wanting and the legs with dark marks on the thighs; and one ♂ example from San Bernardino Mts., California, which is black on the body beneath, except the epimera and spots on the pygidium.

Pachybrachys Sanrita, nov. sp.—Size rather large, stout, livid or red-brown, with bright yellow spots and broken punctate striate elytra. Length 3-4 mm.

Head nearly flat, yellow, with vertex and middle branched spot, bases of antennæ and edge of labrum livid, antennæ yellow, darker towards the tip, barely reaching the middle of the body in ♀, to about the hind coxa in ♂, eyes distant; the thorax finely punctured, broad, distinctly narrowed towards the front, yellow with M in livid broadly marked, and noticeably long median yellow line; depressed behind, with a distinct antescutellar lobe and depressed area in the ends of the M arms, sides of thorax just barely deviated from a straight line in ♂, incurved towards the rear, plainly angulate in ♀; elytra yellow, broad, somewhat depressed, punctures closer than the thorax, confused in the scutellar region, third and fifth intervals fairly well defined, then all are broken up to the two side intervals, which are broad and somewhat irregular, the punctures show a tendency to a biseriate arrangement, which is especially noticeable at the base; the standard spots suffused into livid transverse bands with the edges diffuse in places, leaving two spots on either side, the tip, the base keel (and interval roots from it) and a small sutural shield prominent bright yellow; the marginal stria very moderately curved round the humerus, sinuate in rear, lobe wide and well marked with a row of strong punctures on the curve, below livid brown, with the epimera, sides of abdomen and pygidium picked out in whitish, prosternum sulcate, legs yellowish-red, with light spots on ends of the thighs.

Two ♂'s, 1 ♀, Santa Rita Mts., Arizona. Type coll., Bowditch.

Pachybrachys Snowi, nov. sp.—Large, stout, cylindrical, yellow, with red-brown markings, or sometimes nearly black. Length 3–4½ mm. Head flat, yellow, with usual vertex and central line, antennal spots and margin of labrum in red-brown, finely and rather thickly punctured, antennæ short and frail, reaching about the middle of the body; eyes in ♀ comparatively near, thorax much broader than long, shining, narrowed in front so as to appear swollen behind, moderately and in parts sparsely punctured with medium-sized reddish punctures, M broadly and fairly well defined in the prevailing red-brown, with a smooth median yellow line reaching beyond the middle, rear with only indications of a transverse line and showing only a very moderate antescutellar lobe; the transverse depression becomes vague at the sides and disappears in the arms of the M, the lateral edge, which is angulate, has the usual marginal stria distant from the margin, leaving a distinct wide smooth border, slightly tapered at the front, hind angles obtuse, rounded; elytra stout, broad, slightly compressed at the sides, yellow, with brown punctures and spots, scutellum broad and truncate, forward reflexed edge of elytra sharp and very well marked, punctuation coarse and diffuse except towards the rear and sides, where it falls into rows, with the resulting broad and rather convex costæ, outside standard spots are well marked in brown-red, the rear ones being connected with the inside spots, forming a broken band across the convexity; the middle spots are also somewhat joined, the anterior inside spot is diffuse and the irregular broken yellow, smooth intervals are rather noticeably large towards the side and middle rear, marginal stria with a deep curve around the humerus and abruptly sinuate behind, lobe wide, with a sparse row of large punctures on the edge, below red-brown picked out with lighter on the epimera, sides of abdomen and pygidium, fossa of ♀ a deep round pit, legs yellow-brown, with darker ring on thighs.

Prescott, Baboquivaria Mts., Santa Rita Mts., Douglas, Arizona.

Some of the examples are largely suffused with black, but except in colour they do not seem to differ. The largest of our native forms; named after my friend, the late Prof. Snow.

Pachybrachys crassus, nov. sp.—Stout, cylinder-shaped, pale yellowish white, surface dull, with livid punctures, which are finer on prothorax and very coarse on the elytra. Length, 4 mm.

Head yellow, convex in front, with well-marked livid central line, thickly punctured except on the yellow parts, eyes moderately distant in ♀, very narrowly margined with livid, antennæ frail and thin, about half

the length of the body, dark towards the tip; thorax much broader than long, moderately narrowed towards the front, not one-half as long as the elytra, with M very diffusely marked and with moderately coarse, thickly-placed livid punctures, remainder of surface sparingly punctate, some of the punctures, notably in the yellow side margin, not being coloured with livid, transverse depression very well marked behind, but the depressed area at the end being diffused and not as well marked as in the following species (*cylindricus*), sides subangulate; elytra stout, with very coarse livid punctures, which are confused around the scutel, also in the fourth interval at the base and on the sixth and seventh intervals as far as the convexity—otherwise, arranged in regular rows forming punctate striæ, especially deep and well marked at the side and behind, the third and fourth intervals have a tendency to widen where the shield begins—the general appearance is rather regularly punctate striate, tip plain, marginal stria lightly sinuate behind the lobe, which is broad and well developed, with a few marginal punctures in the curve, the forward edge at the base of the elytra is raised in a sharp edge; body below thickly silvery pubescent, livid with yellowish epimere and pygidium, legs yellow, with usual darker parts in livid, fossa of ♀ deep, longitudinal shining.

One ♀, St. George, Utah, Wickham. Type coll., Bowditch.

Pachybrachys cylindricus, nov. sp.—Large, cylinder-shaped, finely punctured, shining yellow, with standard brown marks on elytra. Length, 3-4½ mm.

Head with convex front, finely and sparsely punctate, badly defined livid central line, but with vertex spot well marked, eyes distant in both sexes, but most so in ♀ and very narrowly margined with livid on the upper side, antennæ yellow, gradually darker to tip, reaching the hind coxa in ♂, shorter, in ♀. Thorax yellow, very little narrowed in front, smooth, very lightly and finely punctured, transverse impression well marked, with its terminations on each side ending in depressed areas, especially well marked in ♀; M fairly well marked in ♂, rather diffuse in female, the ends of sides of M coincide with the depressed areas, sides very slightly curved in ♂, subangulate in ♀; elytra a trifle wider than the thorax, yellow, with coarser livid punctures, and the standard spots which have a tendency to form into transverse bands of brown livid; the punctuation is confused about the scutel, the third and fifth intervals are pretty well defined, so that the punctures on either side form fairly regular striæ, with a well-defined shield in the usual place; between the fifth and humeral intervals the striæ are much broken, as far as the

convexity ; this leaves the two lateral intervals and all the convexity and rear regularly and deeply punctate striate, the tip is smooth, marginal stria sinuate, the lobe well developed, with well-defined row of marginal punctures on the curve, below lightly pubescent, with yellow legs, with a tendency to have the middle parts of the body livid, pygidium yellow ; the dark part of the last abdominal segment is continued over the pygidium on three dark points, the fossa of ♀ deep, long and shiny, rather pointed in front.

♂, ♀, Prescott, Arizona. Type coll., Bowditch.

With the above I associate a ♀ specimen from Chad's Ranch, Utah, which differs in the thorax having no M, but only the transverse rear markings with the end depressions strongly marked, the elytra are yellow and have only the humerus and two round spots on the convexity livid brown, and the punctuation is rather more diffuse.

Pachybrachys tumidus, nov. sp.—Medium sized, cylinder shaped, semi-shining, yellow with very indistinct livid clouds, elytra rather coarsely punctured and with much-swollen costæ. Length, $2\frac{1}{2}$ mm.

Head yellow, front convex, finely punctured, with dark frontal mark and vertex, eyes distant, antennæ short and frail in ♀, barely one-half the length of the body, becoming darker at the tip, thorax wider than long, scarcely narrowed at either end, finely and irregularly punctured, yellow, the M showing as five livid clouds, which hardly connect, the outside ones forming the ends of the transverse depression, which is quite well marked, lateral edge curved ; elytra stout and parallel, diffusely punctate in the scutellar area, and with a tendency to extend the diffusion to the humerus at the side and along the suture at the rear. The basal parts of the third and fifth intervals are much attenuated, the remainder of the surface is striate punctate and the resulting intervals appear smooth and swollen, with a fairly prominent shield, everything else is regular, except there is a disturbance below the humerus, the colour is dull yellow, the standard spots give just a faint dash of livid, the shoulder knobs are dark, marginal stria, fairly well curved round the humerus and sinuate behind, lobe medium, with a row of marginal punctures, body below livid-brown, with epimera, sides of abdomen, last segment and pygidium picked out in yellow, fossa shallow and dull, legs yellow, the prosternum is wide and only slightly concave.

One ♀, Prescott, Arizona. Type coll., Bowditch.

Very like a small washed-out *cylindricus*, but elytral intervals more swollen.

(To be continued.)

CHRYSOPTERUS DORCAS.

In the last issue of this magazine, July, page 225, in a quotation from Dr. Fletcher's letter, I am credited with giving *Hypericum perforatum* as a food-plant of *C. dorcas*. This is a mistake. In the summer of 1884 I spent my holidays on the Bruce Peninsula, and not far from Winfield Harbour. I found two shrubs, *Hypericum prolificum*, Shrubby St. John's Wort, and *Potentilla fruticosa* frequented by swarms of this butterfly. I made a fair collection of specimens, but as I could spare less than an hour, I found no larvæ, and failed to determine the food-plant. I remember going over my specimens with Dr. Fletcher, and I am sure it was "prolificum" I suggested as a food-plant, and not "perforatum." In the summer of 1887 I found the butterfly numerous on the boggy margin of Twin Lake, Port Sydney, Muskoka, where neither of the shrubs mentioned grows, and I suspected *Myrica gale* as a food-plant.

WM. BRODIE, Toronto.

ANOPHELES PERPLEXENS.

BY C. S. LUDLOW, PH. D.

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In connection with the criticism of *A. perplexens*, mihi, made by Drs. Dyar and Knab, it may be of interest to state that Dr. Knab has re-examined my type, and now declares it to be a Pennsylvania mosquito, an aberrant specimen of *A. punctipennis*. If it be a form of *punctipennis*, it is at least so different that no one without a large series showing the intermediate forms would ever suspect it. What I have always known is that it is an *Anopheles* (as restricted by Theobald), and not a *Myzorhynchus*, which is the Philippine genus it resembled as to colouring, and if it were a Philippine specimen was quite as unique.

POSTAGE ON SPECIMENS.—It does not seem to be generally known that the postage on Entomological specimens sent by mail is one cent per two ounces—the same as book postage. It should be stated on the outside of the package that it contains only Entomological specimens. Correspondence must, of course, be sent separately. There is no customs duty on specimens coming into Canada; insect pins and books on Entomology are also free of duty.

SOME RECENT CONTRIBUTIONS TO HEMIPTEROLOGY.

BY J. R. DE LA TORRE BUENO, WHITE PLAINS, N. Y.

For the noteworthy papers on Hemiptera to which these notes apply, I am indebted to the courtesy of the authors. They comprise "Remarques sur quelques Hemipteres de l'Amerique du Nord,"¹ another of Dr. G. Horváth's valuable contributions to a proper knowledge of our fauna; "Tableau Synoptique des Ambrysus et Descriptions d'Especies nouvelles,"² by Prof. A. L. Montandon; "The Genus *Corizus*, with a Review of the North and Middle American species," by Prof. J. C. Hambleton; "Biological Notes on Oriental Hemiptera,"³ by J. C. Kershaw and G. W. Kirkaldy; and last, but emphatically not least, "Some Remarks on the Phylogeny of the Hemiptera Heteroptera,"^{4,5} by G. W. Kirkaldy.

Dr. Horváth in his article confirms many doubts I have had as to the identity of American with European species of Hemiptera. His studies have resulted in the description as new of a number of species hitherto known to us in America by the names of their European congeners, and in the classification of a number of synonymies in other forms. His deductions are, of course, supported by tenable arguments, and strengthened by his great experience and familiarity with the Palearctic fauna. His results are summarized below:

Corizus crassicornis, Linné.

= *novaëboracensis*, Sign.

Corizus viridicatus, Uhler, is a good species, and not a synonym of *C. hyalinus*, Fabricius.

Corizus sidae, Fabricius.

= *Rhopalus pictipes*, Stål.

Nysius thymi, Wolff.

= *Saint-Cyri*, Provancher.

= *groënlandicus*, Provancher.

Nysius ericæ, Schilling.

= *angustatus*, Uhler.

1. 1908, Ann. Mus. Nat. Hung., VI, pp. 555-69.

2. 1909, Bull. Soc. Scie. Buc., XVII, Nos. 5 and 6, pp. 316-30.

3. 1908, Journ. Bombay Nat. Hist. Soc., XVIII, No. 3, pp. 596-98a, text figs. 1-3 and one plate.

4. 1908, CAN. ENT., XL, pp. 357-64.

5. Ann. Ent. Soc. Am., I, pp. 133-52.

Nysius strigosus, Uhler.

= *senecionis*, Baker (nec Schilling).

Cymus discors, Horváth (n. sp.).

= *tabidus*, Provancher.

= *clavicularis* of American authors, not of Fallén.

Cymodema exiguum, Horváth.

= *tabidum* of American authors, not of Spinola.

Ischnorhynchus geminatus, Say.

= *Cymus franciscanus*, Stål.

= *Ischnorhynchus didymus* of American authors, not of Zetterstedt.

= *I. resedæ* of American authors, not of Panzer.

Aphanus umbrosus, Distant.

= *Dorachosa illuminata*, var. *umbrosis*, Dist.

= *Microtoma carbonaria*, Uhler (not Rossi).

= *M. atrata* of American authors, not of Goeze.

Uhleriola, Horváth, new genus to contain *Rhyparochromus floralis*, Uhler, which does not pertain to that genus, nor even to the division *Aphanaria*.

Emblethis vicarius, Horváth (n. sp.).

= *arenarius* of American authors, not of Fieber.

= *griseus* of American authors, not of Wolff.

= *Gonianotus marginepunctatus*, Uhler (not Wolff).

Melanorhopala clavata, Stål.

= *Cantacader Henshawii*, Ashm.

The Ashmeadian types were seen by Dr. Horváth when in Washington. This is sometimes wrongly attributed to the genus *Lasiacantha*, following Lethierry and Severin (Cat. Gen. Hém., III : 18).

Aradus crenatus, Say.

= *dilatatus*, Dufour.

Hypselosoma, Reuter.

= *Glyptocombus*, Heid.

Orthotylus chlorionis, Say.

= *Phytocoris flavosparsus*, F. Sahlberg.

Acanthia xanthochila, Fieber.

var. *limbosa*, Horn. A European form, now recorded for the first time from America.

Empoasca aspersa, Gillette & Baker.

= *tesselata*, Gillette (not Lethierry).

- Macrosteles punctifrons*, Fallén, var. *repleta*, Fieber.
= *Cicadula punctifrons*, var. *Americana*, Van Duz.
Aconura, Lethierry.
= *Athysanella*, Baker.
Agallia 4-punctata, Prov.
= *Ulopa Canadensis*, Van Duz.
Callipterus punctipennis, Zett.
= *Aphis betulicola*, Kalt.

Dr. Horváth's work serves to make one thing very evident, and that is the danger American Hemipterologists incur in identifying our American forms with European species, being guided only by the more or less imperfect early descriptions. It has always seemed to me that the simplest solution of the problem is to describe the American species in hand as new, and leave it to some monographer to determine the synonymy. This, of course, when the European species is not in hand for minute comparison, because if comparison be possible, there should be no room for doubt. On the other hand, certain entomologists, and they not the least eminent, have a surprising faculty for labelling things "var.," or for off-handedly declaring their identity with other and more familiar forms. Hemipterology, as the least studied branch of Entomology, has been a great sufferer from this lack of discrimination.

(To be continued)

COCCIDÆ FROM THE SOCIETY ISLANDS.

BY R. W. DOANE AND EVELYN HADDEN, STANFORD UNIVERSITY, CALIF.

During the summer of 1908 the senior author spent a few weeks on some of the islands of this group studying the scale insects infesting the cocoanut tree. An annotated list of these will appear in an early number of the Jour. Eco. Ento. The following is a list of a few other species taken on various plants, most of which we have been unable to have identified. Miss Hadden is responsible for the identifications of these insects, and should be credited with the new species of *Parlatoria*. Prof. T. D. A. Cockerell kindly examined the new species of *Aspidiotus* and pointed out some of the important characters, so that species should be credited to Cockerell and Hadden. These are the first Coccidæ recorded from these islands.

August, 1909

Icerya Aegyptiaca (Dougl.).

One of the most abundant species; on *Accacia* locust, guava, roses, bora and many other wild and cultivated plants. Tahiti.

Pseudococcus pandani (Ckll.).

A very common species on pandanus and cocoanut trees. On the latter it does considerable damage to the young trees by attacking the new leaves before they are unfolded. Tahiti, Morea, Tetioroa.

Eucalymnatus tessellatus (Sign.).

Common on a reed-like grass and on a low shrub in wet places. Tahiti, Tetioroa.

Coccus frontalis (Green).

Quite abundant on three different species of low shrubby plants. Tahiti, Tetioroa.

Coccus longulus (Dougl.).

Several specimens on a common wild legume. Tahiti.

Saissetia hemisphaerica (Toig.).

Very abundant on a common legume. Tahiti.

Saissetia nigra (Neitn.).

Quite common on four different low bushes. Tahiti.

Saissetia oleæ (Bern.).

A few specimens on the same species of legume that *S. hemisphaerica* and *C. longulus* were found on. Tahiti.

Diaspis Boisduvalii (Sign.).

Very abundant on cultivated roses. Tahiti.

Hemichionaspis aspidistræ (Sign.).

One of the most abundant scales on the cocoanut trees, being particularly abundant on the fruit. Occasionally found also on the grass and shrubs near cocoanut trees. Tahiti, Morea, Tetioroa, Flint Island, Ræatea Tahaa Huaheine.

Aspidiotus cydoniæ (Comst.).

Quite abundant on guava everywhere. Tahiti.

Aspidiotus destructor (Sign.).

The most abundant and destructive scale on the cocoanut trees, causing the so-called "blight." Its chalcid parasite is now controlling it quite effectively in many parts of the Islands. Same distribution as *H. Aspidistræ*.

Aspidiotus rapax (Comst.).

Two specimens of what seem to be this species on a weed from Flint Island.

Aspidiotus herculeanus, n. sp. (Fig. 8).

Female puparium: Scales extremely inconspicuous, resembling the bark and often covered, with the bark, by a green mould. Exuviae indicated by a white ring with a dot in the centre. Exuviae pale yellow in colour, not noticeable with the insect in situ.

Male puparium (?)

Adult Female: Rather large, circular, dark brown in colour. Abdominal segments usually distinct.

Pygidium: *Median lobes* large, very close together, rounded at the apex, and strongly notched on the outer side. *Second lobes* represented by very small, inconspicuous processes; no other lobes present. Median lobes strongly chitinized, the chitinized base projecting far into the pygidium. A long, narrow



Aspidiotus herculeanus n. sp.

FIG. 8.—*Aspidiotus herculeanus*.

chitinized portion extending anterior to the base of the lobes, and two shorter curved ones across the pygidium, near the base.

Lobes followed by a series of large, strong spines, varying in number, but usually from 8–10. A single pair of spines some distance anterior to the first series.

A very large club-shaped gland opening at the outer base of each median lobe; these glands about 200μ long, with a round club-shaped end; the tube swollen, fusiform. The second pair of claviform glands, close to the first, represented by a minute rudiment. Laterad of the second lobe is a pair of small fusiform glands.

No circumgenital glands. Anal orifice close to the base of the median lobes. Arranged in a somewhat regular row, laterad of the chitinized portion of the pygidium, and scattered irregularly at the bases of the lobes are a number of cylindrical, tubular spinnerets, suddenly

narrowing to a fine thread and opening by minute-oval pores upon the dorsal surface. Spinnerets conspicuous in some specimens, in others not visible or extremely inconspicuous.

Adult male not known. *Habitat*, on bark of (?).

Morganella Maskelli (Ckll.).

Very common on guava. Tahiti.

Chrysomphalus aonidum (Linn.).

Moderately abundant on guava. Tahiti.

Lepidosaphes Beckii (Newm.).

Very abundant on orange and lemon trees. Tahiti.

Lepidosaphes Gloverii (Pack.).

A very abundant scale on cocoanut trees. Tahiti, Morea, Tetioroa,

Parlatoria cinerea, n. sp. (Fig. 9.)

Female puparium: Circular, slightly convex, pale brownish-gray, paler at margin. Pellicles overlapping, yellowish-brown, submarginal.

Male puparium: Elongate, semi-transparent, pale brownish-white. Pellicles at the anterior extremity; brown.

Adult female: Rounded in front, slightly pointed behind; broadest across abdominal segments. Abdominal segments moderately distinct, colour dull brown.

Pygidium with six prominent, strongly-chitinized lobes. The

median lobes largest, broad at the base, with the inner sides nearly parallel; a single notch on the inner, two notches on the outer margin. Second pair of lobes rounded at the posterior end, the outer margin slanted with two, usually distinct, notches; the inner margin straight. Third pair of lobes resembling the second, but much shorter. Fourth lobe occasionally developed into a weakly-chitinized crenate projection. Depressions between the lobes strongly chitinized. Two chitinized depressions between the third and fourth lobes.

Two plates between the median lobes, not noticeably fringed; two between the first and second lobes, three between the second and third.

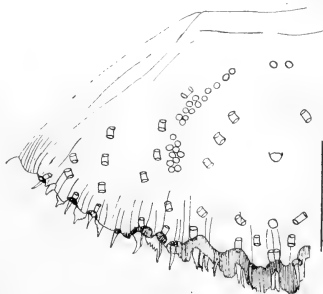


FIG. 9.—*Parlatoria cinerea*.

Toward the anterior the plates on the margin become broader and the lateral fringing more marked. The rudimentary lobes appear to form the bases of the plates.

Marginal spines situated at the base of each lobe and at intervals between the squames. Semi-lunar pores opening in depressions between the lobes. Dorsal pores rather numerous.

Circumgenital glands in four groups, occasionally five. Anterior laterals 10-14. Posterior laterals 9-12. Anterior group, when present, 1-2. Anal aperture some distance below genital aperture.

Adult male not known.

Habitat: Abundant on bark of orange tree and on a cultivated vine.

BOOK NOTICE.

BULLETIN 171, ONTARIO AGRICULTURAL COLLEGE.

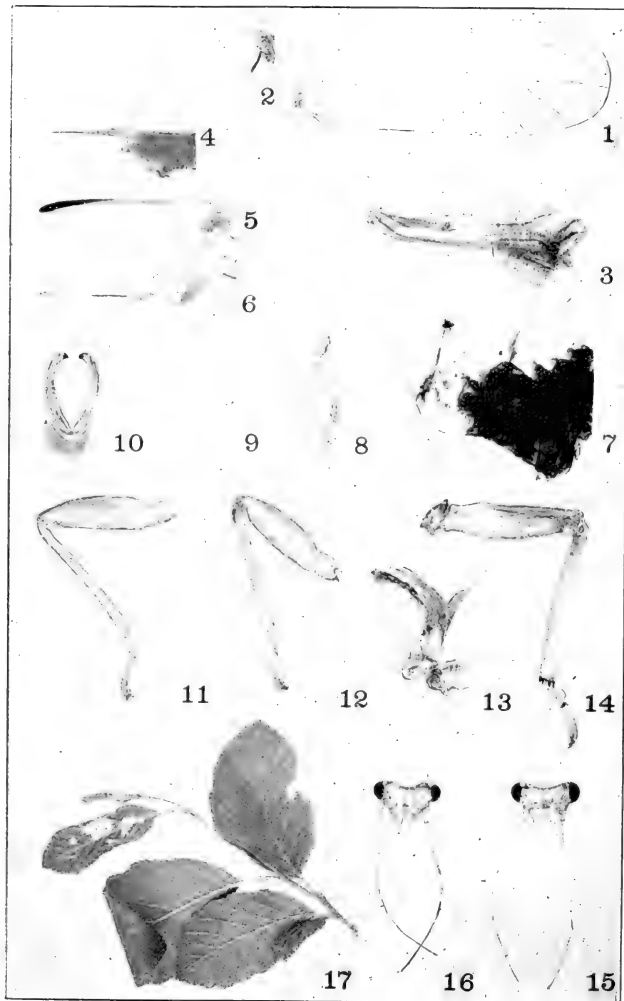
A most compact and useful publication has just been issued by the Ontario Department of Agriculture, as Bulletin 171, entitled, *Insects Affecting Vegetables*, by Rev. Prof. Bethune, and *Fungus Diseases Affecting Vegetables*, by Messrs. J. W. Eastham and J. E. Howitt, of the Ontario Agricultural College.

Though the work consists of but 64 pages, including the index, the grower of vegetables will readily find more information about his most dreaded pests and the best means of combating them than in more pretentious volumes. The first part, dealing with insects, begins by calling attention to a number of kinds of general feeders, such as aphids, cut-worms, grasshoppers, which attack almost anything that comes in their way; and then the various vegetables are treated of in alphabetical order, with their special enemies. The attacks of fungus diseases often follow in the wake of insect injuries, and these are referred to in a well-illustrated chapter arranged in the same order as the insects, with treatment recommended for each, but, as the authors say, "Generally speaking, in combating fungus diseases, methods of prevention only are practicable, as once a fungus is within a plant nothing can be done to destroy it." The remaining chapters are devoted to Insecticides and Fungicides, how to manufacture and apply them to the best advantage.

The Bulletin should be read and preserved for ready reference by everyone interested in the growing of vegetables.

A. F. W.

Mailed August 9th, 1909.



DOWNY PSYLLID OF ALDER.

The Canadian Entomologist.

VOL. XLI.

GUELPH, SEPTEMBER, 1909.

No. 9.

DOWNY PSYLLID OF ALDER, *PSYLLA FLOCCOSA*, NEW SPECIES.*

BY EDITH M. PATCH, ORONO, MAINE.

The Psyllid under consideration has been conspicuous upon the alder (*Alnus incana*, Willd.) each season during my acquaintance with the vicinity of Orono, Maine. As the host-plant is looked upon as a common nuisance, no attention has been paid to this insect from an economic standpoint, and no further thought was given it except to admire the plummy appearance of the alder tips during June, or to be annoyed because it was impossible to go through this growth without being covered by the somewhat sticky flocculent matter.

This Psyllid was found to be convenient to use in connection with a study in wing venation,[†] but it was not until that paper was about ready for press that I tried to determine the species, and found that it was undescribed, for America at least. The Psyllid was named in that paper, and the description held until the present season should give opportunities for a few colour and life-history notes.

If the fact that I am not a "Psyllidist" is revealed by the generic characters creeping into the description, the accompanying photographs will perhaps help out the deficiency.

The eggs are probably deposited upon the alder in the fall, as the newly-hatched Psyllids appear about the time the alder leaves are unfolding in the spring, and settle upon the ventral surface of the leaves.

On June 10, 1909, nymphs previous to the last (or pupal) instar were examined. Head and thorax, both dorsal and ventral, were pale green, the abdomen, both dorsal and ventral, was pale yellow. Eyes bright pinkish-red. Tips of antennæ, legs and beak dusky. Wing-pads small and full and not flat upon the dorsum as in the next stage. These nymphs were congregated on young leaves on the ventral side along the ribs. To the naked eye they presented a loose, woolly mass on account

*Papers from the Maine Agricultural Experiment Station: Entomology, 36.

†Homologies of the Wing-veins of Aphididæ, Psyllidæ, Aleurodidæ and Coccidæ.

of the white secretion. Under a lens the long wax filaments were seen to curl up in a slight curve from the body.

June 26, 1909.—The flat crab-like nymphs in the last or pupal instar are at this date full grown and ready for the transformation. The thin wing-pads lie flat upon the dorsum. Antennæ, legs, wing-pads and tip of abdomen are dark smoky. The general colour of head, thorax and abdomen is green. Antennæ with ten joints. Hind tibiæ and tarsi with spurs similar to those of the adults, but less pronounced. Length of body, 3.19 mm.

At this stage the nymphs are densely covered with a fluffy, silky flocculent mass, and look like walking ostrich-plumes. The ventral surface of the terminal leaves is by this time well filled with the white stuff, as well as the new growth of the twigs for four to six inches from the tip. A heavy storm dissipates this.

June 26, 1909.—The mature winged forms are present in great numbers on the ventral side of leaves, freshly emerged and not yet taken to flight. (Mature specimens dated July 26, 1905, and August 17, 1905, are in the Station collection.) The following colour descriptions are made from fresh material. Older specimens may not retain the same tints:

Mature Form.—Length of body of female, 4.2 mm.; male, 3.5 mm. Head, thorax, abdomen clear blue-green. Thoracic lobes and transverse portions of the abdominal segments are tinged with yellow, so that the Psyllid has a yellowish-green appearance. The ocelli are orange-yellow. Antennæ with ten segments; i-ii are pale green, iii-iv-v are whitish with discal joints black, remaining segments are black. The number of antennal joints is not constant, the segmentation varying even on the two sides of the same Psyllid. Ten seems to be the normal number. A single large round sensorium is present at the distal portion of iv, vi, viii and ix of both the male and female; x is tipped with two stout hairs.

Legs have femora green, tibia and tarsus whitish, with black claws. Tibial and tarsal spurs of hind leg black. At the base of the last pair of legs is a pair of prominent green spur-like projections extending caudad. The caudal tip of the abdomen is yellowish-brown.

Along the extreme distal tip of the hind tibia are seven sharp spurs. At the distal tip of the first tarsal joint are two similar spurs.

The wings are uniformly transparent, and are veined as is typical for the genus. All the veins except that of the claval suture are distinct in the fore wing. The veins in the hind wing are almost invisible. Length of fore wing, 5.35 mm.

EXPLANATION OF PLATE.

Psylla floccosa, new species.

1. Fore wing.
2. Hind wing.
3. Genital segment of female.
- 4, 5, 6. Details of foregoing.
7. Genital segments of male.
- 8, 9, 10. Details of foregoing.
11. Front leg.
12. Second leg.
13. Showing ventral spur at base of third leg.
14. Third leg, showing tibial and tarsal spurs.
15. Head of male.
16. Head of female.
17. Nymphs in flocculent mass on terminal leaves of *Alnus incana*,
June 10, 1909.

NEW PSEUDOSCORPIONIDA.

BY NATHAN BANKS, EAST FALLS CHURCH, VA.

In the CANADIAN ENTOMOLOGIST for 1891, pp. 161-166, and 1893, pp. 64-67, I described a number of these small Arachnids, and in the Journ. N. Y. Ent. Soc., 1895, pp. 1-13, I presented a review of the forms then known from North America. Since then many specimens and species have been collected, and in these pages ten of the new forms are characterized, and a new genus erected for a form near *Garypus*.

Chelifer fuscipes, n. sp.—Cephalothorax and palpi dark brown, fingers more reddish, dorsum of abdomen brown, with a broad pale median stripe, legs brown, paler at tips of some of the joints. Cephalothorax subtriangular, minutely granulate, with a few short, nearly clavate hairs; eyes distinct. Palpi with fine short subclavate hairs, except on fingers, hand and outer side of the tibia, which are simple; trochanters with distinct tubercle behind, femora a little longer than cephalothorax, subpedicellate, largest at middle; tibiæ about as long as femur, pedicellate, evenly convex both sides, but a little broader than femur; hand barely longer than tibiæ, about twice as broad as femur, fingers shorter than hand, stout, curved. Dorsal abdominal scuta finely granulate, outer side very distinctly prolonged behind into acute spines.

Length, 1.8 mm.

From Claremont, Calif. (Baker).

September, 1909

Chelifer persimilis, n. sp.—This is extremely similar to *C. cancroides*. The male differs at once from *C. cancroides* by having the margins of the abdominal segments more strongly produced behind, and almost all of the segments are so produced (while in *C. cancroides* only a few of the basal segments are produced, and these not half as much). The palpus is similar to that of *C. cancroides*, but the tibia is more swollen on the inner margin, and the hand is heavier and the fingers slightly shorter and more curved. It is of the same size and coloration.

Specimens from Pecos, New Mexico (Cockerell); Las Vegas, New Mexico (Cockerell); Eagle Spring, Organ Mts., New Mexico, and Roswell, New Mexico, Aug. (Cockerell).

Chelanops partitus, n. sp.—Cephalothorax and palpi red-brown, former paler behind. Cephalothorax fully one and a-half times as long as broad; surface closely and minutely granulate, and with many short, clavate hairs. Trochanter strongly bigibbose behind; femur fully as long as width of the cephalothorax, slightly concave in front near the tip; tibia one and a-half times broader than the femur, evenly convex on outer side, inner side rather suddenly swollen and slightly tapering beyond; claw longer than the cephalothorax, hand about twice as broad as femur, hardly as long as tibia, tapering to the stout curved fingers, which are fully as long as hand; fingers with fine simple hairs, rest of palpus with short clavate hairs. Legs with short almost clavate hairs. Abdominal scutæ each with about eight clavate hairs on the posterior border.

Length, 3 to 3.5 mm.

From Pt. Yuma, Arizona. Related to *C. Arizonensis*, but not as darkly coloured, smaller, and the fingers are plainly longer than the hand.

Chelanops diversus, n. sp.—Cephalothorax dark brown, palpi dark red-brown, body and legs paler, scutæ brown, but the basal three are only brown near the middle. Cephalothorax barely longer than broad, densely granulate, with extremely short, almost clavate hairs; groove behind the middle, its ends curving forward. Palpi not as long as body, very heavy; femur rather broadest near base, as long as width of cephalothorax; tibia almost as long as femur, outer side evenly convex, inner side suddenly swollen and then nearly straight, barely broader than the femur; claw longer than cephalothorax and mandibles, hand very broad, about twice as broad as femur, broadest at base and tapering to the fingers, which are barely longer than width of hand, all with short fine hairs, those on femur and tibia almost clavate. Legs with short, simple hairs. Abdomen rather

elongate, with some clavate hairs on the sides, about eight on the hind border of each scutum.

Length, 2 to 2.2 mm.

From Lake Worth and Palm Beach, Florida.

Garypus Californicus, n. sp.—Cephalothorax dark brown, behind showing a pair of pale submedian spots, dorsal scutæ brownish, paler in middle, and each with a central dark brown dot; palpi yellowish, the hand more red-brown. Cephalothorax subtriangular, emarginate in front, fully as long as broad behind, with two large eyes close together, the hind one looking backward. Femur of palpus plainly longer than cephalothorax, but little widened apically, tibia much shorter, but plainly broader, scarcely convex on middle of inner side, claw large and long, the hand barely shorter than tibia, but nearly twice as wide, being convex on inner base, outer side slightly and evenly convex, fingers plainly longer than hand, strongly curved; all clothed with fine, short, simple hairs, some at base of fingers much longer; hairs on posterior margin of abdominal scutæ almost invisible. Legs long and slender, with fine, simple hairs; trochanters visible on legs iii and iv. Ventral scutæ also each with a central dark dot.

Length, 4.5 mm.

Two specimens from Palo Alto, Calif., and San Nicolas Island, Calif.

GARYOPS, n. gen.

In appearance similar to *Garypus*. The serrula attached to mandibles; the cephalothorax narrowed in front, and a pair of tuberosities each side, but no eyes on them. The femora of all legs show the trochantins distinctly separated, as plain in femur i as the others; no apparent transverse groove on cephalothorax; mandibles small, a distinct bifurcate stylet; coxæ of pedipalpi prolonged on median line in front. Dorsal scutæ of abdomen not plainly divided; coxæ i and ii do not meet on the middle line, and coxæ i barely touch each other at one point.

Garyops depressa, n. sp.—Pale yellowish, anterior part of cephalothorax and the palpi red-brown. Cephalothorax about two-thirds as wide in front as behind, constricted at anterior third, and here above is a black mark or slight tubercle, posterior border of cephalothorax prolonged to a median point, which indents the basal abdominal segments, its surface smooth. Palpi nearly as long as body, not very heavy, the trochanter large, with a prominent corner at base behind; femur about as long as cephalothorax, suddenly swollen, broadest at base; tibia shorter than the femur, not much swollen on inner side; claw longer than femur, hand

about as long as tibia, but little broader, broadest near base, fingers not near as long as hand, quite strongly curved, and darker than hand, all parts with fine simple hairs, about one-half the width of the joints, except some at the base of the fingers. Abdomen moderately broad, flat, the setæ not distinctly divided, but apparently some of the posterior ones are divided.

Length, 2.5 mm.

Punta Gorda, Florida (Mrs. A. T. Slosson).

Ideobisium tibiale, n. sp.—Cephalothorax and palpi red-brown, rest of body and legs pale. Cephalothorax a little longer than broad, rather broader behind than in front, surface smooth, with a few long bristles, anterior margin rather prominent in the middle, two eyes each side, about one-half their diameter apart; mandibles large, with a few long hairs, stylet slender, trifid at tip. Palpi quite long; trochanter nearly twice as long as broad, sides subparallel; femur plainly longer than the cephalothorax, enlarging from base to tip; tibia distinctly shorter than femur, long pedicellate, but one and a-fourth broader than femur, inner side but little swollen; hand as long as femur, not twice as broad as tibia, but little swollen, mostly on inner side, fingers plainly shorter than hand, stout and but little curved; all with long simple hairs. Abdomen not very elongate, scuta smooth, with a few simple hairs; femora i and ii divided, basal part longer than apical part; femora iii and iv showing trochantins distinct.

Length, 4.2 mm.

From Florissant, Colo., 8,000 feet.

Ideobisium magnum, n. sp.—Cephalothorax and palpi dark red-brown, dorsal scutæ brown, rest of body and legs pale. Cephalothorax smooth, about as broad as long, a rounded tubercle in middle of front margin, eyes large, less than one-half their diameter apart, a few pale spots each side on the posterior part of the cephalothorax; mandibles large, with a few long hairs, stylet slender, with an outer branch toward tip, the latter bifid. Trochanter of palpus concave behind; femur subpedicellate, hardly as long as the cephalothorax plus the mandibles, as broad at middle as at tip; tibia plainly shorter than femur, strongly pedicellate, inner side suddenly swollen and then straight; hand large, as long as tibia, and about twice as broad, tapering to the stout fingers, which are plainly a little shorter than the hand; all parts with fine simple hairs.

Dorsal scuta smooth, with a few simple hairs. Legs long, femora i and ii divided beyond middle, tibia iv longer than the cephalothorax.

Length, 6.5 mm.

From Mt. Shasta, Calif. (Lembert). It is our largest species.

Olpium frontalis, n. sp.—Pale yellowish-brown, palpi darker yellow-brown, rest of body and legs pale. Cephalothorax about one and a-fourth times as long as broad, more than twice as broad behind as in front, surface nearly smooth, with a few very short simple hairs, two distinct eyes each side touching each other. Mandibles small; stylet rather long, simple, and with an out-turned tip. Trochanter of palpus convex in front, concave behind; femur not as long as cephalothorax, broadest beyond middle, granulate in front; tibia plainly shorter than femur, but plainly broader, both sides rather evenly convex; claw large and heavy, hand about as long as femur and twice as broad, sides subparallel, but rather broadest near the base, fingers stout, two-thirds of length of hand; all with short simple hairs, except four long ones at base of fingers. Abdomen elongate; posterior scuta divided, with a few short simple hairs. Legs i and ii divided in middle, trochanters distinct on hind legs.

Length, 3.5 mm.

Las Vegas, N. Mex. (Cockerell).

Obisium transversum, n. sp.—Pale yellowish on the cephalothorax and palpi, rest of body and the legs paler. Cephalothorax one and a-half times as long as broad, surface smooth, slightly narrowed in front of eyes, the front margin slightly convex; behind the middle is a distinct transverse furrow, with its ends slightly curving forward, two distinct eyes each side; mandibles large, more than one-half as long as the cephalothorax, no stylet. Femur of palpus hardly as long as the cephalothorax, barely broader in the middle; tibia a little shorter than the femur, but broader, outer side near base is slightly concave, inner side rather suddenly swollen and then nearly straight; claw as long as cephalothorax plus mandibles, about twice as broad as femur, the hand very broad near base, tapering each side to the fingers, which are stout, slightly curved and as long as hand; all with fine simple hairs, many of them very long. Legs short, with simple hairs, anterior tips of coxæ i and ii with a distinct tooth. Abdomen (♀) about two and a half times as long as cephalothorax; the segments smooth.

Length, 2 mm.

From Pecos, New Mexico (Cockerell).

THE EDWARDS COLLECTION OF BUTTERFLIES.

The Editor of the Canadian Entomologist :

DEAR SIR,—I have read with interest your account of the life of my deceased friend, Mr. William Henry Edwards, in the August number of the CANADIAN ENTOMOLOGIST. I detect on the last page an error. It is not of great importance, but you are incorrect in stating that Mr. Edwards's "extensive and valuable collections were purchased a few years ago by the Carnegie Institution at Pittsburgh and are now in the care of Dr. W. J. Holland, the Director." Long before the Carnegie Institute in Pittsburgh existed, or was even thought of, Mr. Edwards, being desirous of publishing the third volume of the "Butterflies of North America," but lacking the necessary funds, wrote me that he contemplated selling his collection, and intended offering it to the Trustees of the British Museum in the hope thereby of securing enough money to enable him to go on with his work. I wrote to him urging him not to do this, as in my judgment the types of his species should be preserved in America, and made him an offer to pay the bills for the publication of the third volume of the Butterflies of North America, as they became due, on condition that his collection should be turned over to me when he was through with the same and had completed his studies. This was done. I paid the bills for the drawing, lithographing, and printing of the plates and text of the third volume of "The Butterflies of North America," and finally received his entire collection, which forms a part to-day of my own private collection, which I have in recent years deposited in the Museum of the Carnegie Institute, desiring, while having it near by me, to make it available, with other collections, for purposes of study on the part of American students.

As I have intimated, the matter is not of burning importance, but your statement conveys an entirely erroneous impression of the transaction. I have always pleased myself with the thought that I was rendering a service to the cause of American science by retaining in this country Mr. Edwards's types, and I think I ought to have the credit for doing what I did, and that it should not be given to an institution which was not in existence at the time.

W. J. HOLLAND, Director Carnegie Museum.

SOME RECENT CONTRIBUTIONS TO HEMIPTEROLOGY.

BY J. R. DE LA TORRE BUENO, WHITE PLAINS, N. Y.

(Continued from page 296.)

Prof. Montandon again lays the students of American Heteroptera under deep obligations by bringing down to December of last year the important and exclusively American Naucorid genus, *Ambrysus*, disposing it in an excellent synoptic table. The new species described are the following :

<i>Ambrysus Horvathi</i> , Mont.	—Perú.
<i>A. Colombicus</i> , Mont.	—Colombia.
<i>A. nitidulus</i> , Mont.	—Mexico.
<i>A. ochraceus</i> , Mont.	—Bolivia.
<i>A. Peruvianus</i> , Mont.	—Perú.

Hambleton's review of *Corizus* is most useful, and clears up the unfortunate chaos into which our American species had fallen. His table for the separation of species, complemented by his description of each, together with the excellent plates, showing several of the species and the distinctive characters of all, will enable anyone to readily identify his American material. The number of species is fixed at 12, of which those that occur in the Middle and New England States are named below together with their synonyms :

<i>Corizus crassicornis</i> , Linné.
= <i>punctiventris</i> , Dallas.
= <i>novæboracensis</i> , Signoret.
<i>C. lateralis</i> , Say.
= <i>punctipennis</i> , Dallas.

This is our commonest eastern form, and, I suspect, furnishes the majority of records of other species, especially of *C. sideæ*, which does not appear to have been recorded authentically from further north than Maryland.

<i>C. nigristernum</i> , Signoret.
= <i>Bohemanni</i> , Signoret.

In the descriptions I miss other measurements in addition to the length and breadth, as well as the proportions of the antennal segments ; and also there is more attention paid to colour than would appear to me to be desirable in a genus so variable in this character.

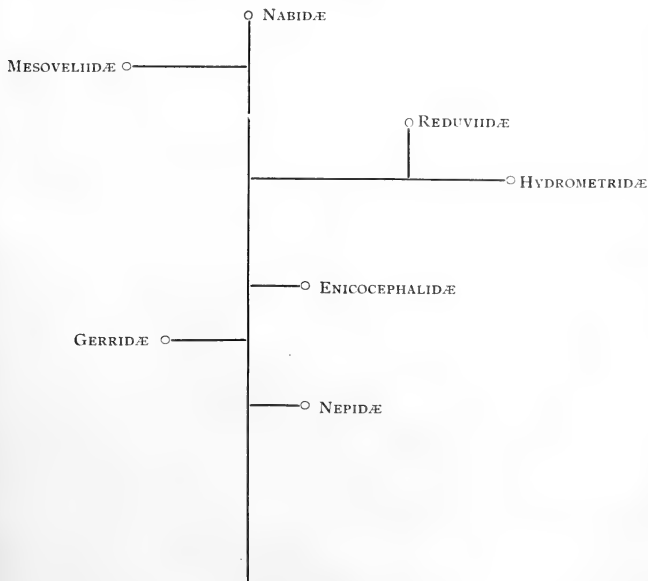
In the "Biological Notes," Kershaw and Kirkaldy give us brief life-histories of the Indian Pyrrhocorid bug, *Dindymus sanguineus*, and the

Lygæid, *Cenocoris marginatus*. These notes are of great interest, brief though they be, and the coloured plate is excellent. *Dindymus* is remarkable among Heteroptera, in having no less than *seven* moults and a somewhat long life-cycle, this being about 110 days. The plate shows the ovum, the first, fifth and eighth nymphal instars, and the adult. Contrary to the accepted idea of the food-habits of the Pyrrhocoridae, this species is carnivorous, and was fed on flies. The nymphs apparently prefer termites; the older nymphs, as well as the adults, feed on thin-shelled snails, other bugs, caterpillars, pupæ, etc.

The complete life-history of *Cenocoris* was not worked out. The bug is vegetarian, and its chief food-plant appears to be *Toxocarpus Wightianus*. The life-cycle took 53 days, but may be shorter in wet seasons. The plate gives two figures of the ovum, a couple of nymphal instars and a figure of the red recently-transformed adult hanging from a twig, and another of the black, fully coloured, mature adult.

The mooted question of the Hemipterous phylogeny is discussed by Kirkaldy, and he presents a family-tree, based on Schiödte's two main divisions. In a brief survey of the various recent attempts to classify the Order, he points out their deficiencies. His strictures appear to me well founded, and the objections he urges should be plainly evident to anyone who has a sufficiently extensive collection, or is at all familiar with the literature. Now, as to whether or not Kirkaldy's proposed classification will meet the exacting requirements of modern scientific research is a question to be solved by experience and a wider knowledge of Hemipterous metamorphoses and life-histories. I think there can be no question that the Heteroptera is one of the most ancient and most isolated groups of insects, of which the aquatic forms are the most highly specialized and furthest removed from the ancestral type. In the matter of the land forms, I confess my views are more in the nature of pious opinions, since thus far I have not studied them with the same minute attention that I have given to the aquatics, and therefore my interpretation of their relationships rests on the work of others. To me our Hemipterous groups do not appear as links in a chain or osculating circles, but rather as the ends of the twigs of the family-tree, vastly removed from the central stem, and still more from the root. Therefore, in the majority of instances, on our present knowledge, it is not possible to offer a phylogeny showing a direct line of descent. From this generalization, however, we must except four of the six families of Notonectoideæ. These are, in the order of their primitiveness, the *Acanthiidae* (*Saldidae* of authors), *Ochteridae* (*Pelagonidae* of

authors), *Naucoridæ* (including *Nerthridæ*, which has been joined to this family), and *Belostomatidæ*. Here we have a series which, while the families are distinct, is nevertheless a direct one, in which the divergence between genera is not unbridgable. The two remaining families are obviously highly specialized, and differ as much between themselves as they do from the other four. On the other hand, I believe his arrangement of the *Nepoideæ* is susceptible of advantageous modification. It appears to me evident that the *Hydrometridæ* and *Mesoveliidæ* are not subfamilies of the *Gerridæ*, but are entitled to family rank. The true *Gerridæ* are much older than either and spring from the main stem shortly after the *Nepidæ*, while the *Hydrometridæ* are more closely allied to the *Reduviidæ* proper, and the *Mesoveliidæ* to the *Nabidæ*. In this respect I think Kirkaldy's tree should be modified thus :



The *Gerridæ* are thoroughly and completely adapted for their semi-aquatic life ; the *Hydrometridæ* are in process of adaptation, and the

Mesoveliidae also, but not to as great a degree. I do not believe that the sericeousness of the underbody is necessarily an indication of adaptation to an aquatic or semiaquatic habitat, because we can see this in many land forms, especially among the *Lygæidæ* (of the older authors, not of Kirkaldy). Nor is ability to walk on the surface a sign of this peculiar fitness, because there are other forms, such as some Diptera, a few Hemiptera (Heteroptera and Homoptera), etc., which walk on the waters at a pinch, and this last is what *Mesovelia* does. Under compulsion it runs rapidly out upon the water from its habitual and customary haunts on floating vegetation (Algæ, Duckweed, etc.). *Hydrometra* also hugs the shore, and it does not appear to go any very great distance from land. Now, the true *Gerridæ* are bold navigators, and put out fearlessly upon the bosom of the deep, with which they are eminently fitted to cope.

But on the whole, Kirkaldy's paper is highly suggestive and ought to lead to a careful re-survey of the whole subject of the classification of the Heteroptera, so sadly neglected by competent observers, even unto this day. Nothing short of a drastic revision of the whole Order will avail us.

NOTES ON PACHYBRACHYS AND DESCRIPTIONS OF NEW SPECIES.

BY FRED. C. BOWDITCH, BROOKLINE, MASS.

(Continued from page 292.)

Pachybrachys nubilus, nov. sp.—Medium sized, cylinder shaped, shining, light yellow, with indistinct livid spots; finely punctate with well-marked elongate triangular shield. Length, $2\frac{1}{2}$ mm.

Head convex, yellow, a faint tinge of livid on the vertex and a very fine well-marked central line and two small spots at the roots of the antennæ, which are yellow, becoming darker towards the end, and reach about the middle of the abdomen (σ), eyes distant; thorax yellow, proportionally long, very slightly narrowed towards the front, punctuation rather coarse and thick, antescutellar lobe well marked, the posterior edge thickened on either side, M faintly indicated in livid, sides lightly angulate; elytra parallel, yellow, with brown punctures; of about the same width as the thorax, standard spots diffusely indicated in livid, punctures confused in the scutellar area, the third, fourth and fifth intervals are fairly regular, and then the sixth and following are broken up to the two side intervals, all the costæ are well marked and nearly regular on the convexity; there is a well-marked elytral shield, triangularly elongated in the rear, and the rear portion forms part of a line of yellow spots which

stretches across the elytra and which are smooth and as if planed down, marginal stria very lightly curved round the humerus and sinuate on the extreme edge, body below livid, with lighter epimera, abdominal sides and pygidium, legs yellow-brown, with clouds and spots on the thighs.

Two ♂'s, Bill Williams' Fork, Arizona; ♀, St. George, Utah. Type coll., Bowditch.

Pachybrachys longus, nov. sp.—Medium sized, elongate, slender, cylindrical, dull pale yellow, with brown punctures and striæ. Length, 3 mm.

Head yellow, front almost flat, thickly punctate, with dark median line and vertex, eyes close (for female), probably nearly approximate in ♂, which is wanting, antennæ thin, yellow, darker towards the tip, reaching middle of body (♀), thorax about one-half as long as elytra and nearly as long as wide, a little rounded and narrowed at front and rear, yellow, thickly covered with fine brown punctures, which have a tendency to thicken, where the M spots would come, and leave the sides free, lateral edge very finely subangulate and sinuate behind, transverse depression very moderate; elytra yellow with moderate brown punctures, which are diffuse on the anterior half, except for the third, fifth and humeral intervals, which are complete to the base, shield well marked, intervals behind smooth and well marked, tip smooth, marginal stria very lightly curved and sinuate, lobe broad and well developed, with a marginal row of punctures which do not go beyond the humerus anteriorly, below and legs yellow and livid, variegated, with the epimera, last segment and pygidium yellow, the last with three livid spots; fossa deep and rounded.

One ♀, Tucson, Arizona. Type coll., Bowditch.

Pachybrachys proximus, nov. sp.—Medium sized, cylindrical, pale yellow, with livid clouds and punctures. Length, $2\frac{1}{2}$ mm.

Head with pubescent, and nearly flat front, punctured, with heavy frontal and vertex marks, the former divided so as to include the roots of the antennæ, which are quite dark throughout, but have the basal joints somewhat brown-red, and reach a little beyond the middle of the body, eyes distant (♂), thorax yellow, wider than long, narrowed at front and also a little at rear, in its greatest length not quite half as long as the elytra, thickly but unevenly, finely, livid-brown punctured, M diffusely indicated by the thickening of the punctures, which leave the edges more or less free, especially the sides and anterior angles, lateral edge subangulate and

well forward of the middle, transverse impression not well defined; elytra parallel, pale yellow, with moderate livid-brown punctures, which are diffused on the anterior half up to about the eighth interval, except that the third and fifth intervals are narrowly complete to the base and show a well-marked triangular shield, the rear and side is regularly striate punctate, the colour from the punctures more or less suffusing the intervals, the exterior standard spots also show faintly in livid, marginal stria lightly curved and barely sinuate, lobe well developed, with a strong row of marginal punctures, body below very dark brown, with the usual parts picked out in dark red, legs light reddish-yellow, with light ends to femurs and shanks.

One ♂, Leeds, Utah. Type coll., Bowditch.

As compared with *longus*, the thorax is more transverse and not as long, the eyes in *proximus* are much more distant and the antennæ and body below darker. The punctuation of the elytra is very similar.

Pachybrachys truncatus, nov. sp.—Small, pale yellow, moderately shiny, parallel, with livid marks and punctured striæ. Length, $2-2\frac{1}{2}$ mm.

Head convex, yellow, with livid marks on vertex, front and bases of antennæ; eyes distant, antennæ yellow, darker at ends, reaching about the middle of abdomen (♂), short in ♀; thorax yellow, hardly appreciably narrowed either front or rear, finely and moderately punctured, with M faintly indicated in livid (♂), much darker in ♀, depressed behind, with a well-marked antescutellar lobe, rear margin on each side thickened and raised, sides angulate in both sexes; elytra a trifle wider than the thorax and running parallel to the rear, yellow, with livid punctures and with the standard spots more or less developed in livid, in one ♂ the anterior inside spot is the best developed, in another ♂ the outside spots and the first inside are all traceable, and in the ♀ they are fairly well marked and much darker, and the rear ones are suffused into a transverse band; the punctuation is confused about the scutel, while the third, fourth and fifth intervals are almost entire, those between the fifth and the two side intervals are broken; otherwise regularly punctate striate; elytral shield well marked and triangular; marginal stria very lightly curved round the humerus and slightly sinuate behind, lobe is feeble, with a row of fine punctures; below, ♂ yellow, with livid side-pieces and sides of abdomen, ♀ all dark livid, with light epimera and sides of abdomen, legs yellow, with occasional dark clouds.

Two ♂'s, Prescott; one ♀, Santa Rita Mts., Arizona. Type coll., Bowditch.

Pachybrachys Nero, nov. sp.—Same size and shape as *truncatus*, Bow., but dull whitish-yellow and nearly regularly punctate striate. Length, $2\frac{1}{2}$ mm.

Head convex, yellow, with darker vertex, and central line and spots at the base of the antennæ, which reach about the middle of the abdomen (δ), eyes distant, thorax wider than long, gradually narrowed to the front, with a well-marked antescutellar lobe and with the posterior margin somewhat thickened, moderately and finely brown punctate, one specimen with a well-marked brown M, the other specimen with the M very faintly indicated, sides feebly angulate; elytra dull yellow, almost regularly punctate striate, the brown punctures slightly thicker and confused in the two short scutellar striæ, and showing a tendency to become biseriate in the anterior parts of the first four or five striæ, the sutural and third and fourth intervals from about the middle are much widened posteriorly and present the appearance of smooth, flat, longitudinal stripes; one of the specimens has a faint suspicion of one or more of the standard spots, but not prominent; marginal stria feebly rounded about the humerus, and in one specimen it might be called feebly subangulate, and barely sinuate behind, lobe moderate, with a row of fine marginal punctures, body below brown, with epimera, legs, sides of abdomen and pygidium yellow.

Two δ 's, Prescott, Arizona. Type coll., Bowditch.

Pachybrachys Sevier, nov. sp.—Medium sized, shining dirty-yellow, almost regularly brown punctate striate. Length, $1\frac{1}{2}$ – $2\frac{1}{2}$ mm.

Head yellow, front lightly convex, punctured, with dark spots at base of antennæ, faint frontal and vertex marks, antennæ darker, with light basal joints, barely one-half as long as body in φ , eyes very distant, thorax broader than long, shiny yellow, with rather large brown punctures diffused over its surface, M at most only very faintly indicated by clouds, transverse depression fairly well marked, lateral edge subangulate; elytra shiny yellow, regularly brown punctate striate, except that the scutellar area is confused, in one example there seems to be a tendency to have the third and fourth intervals widen at the convexity, marginal stria both lightly curved and sinuate behind, lobe fairly developed with a row of punctures, body below dull black, with the epimera, last segment and pygidium yellow, legs red-brown, with lighter bases to the femur; fossa shallow and dull.

One φ , Sevier Lake, Utah. δ and φ , Green River City, Wyoming. Type coll., Bowditch.

Pachybrachys laevis, nov. sp.—Small, or medium sized, cylindrical, semi-shining dirty-yellow, punctate striate, more or less clouded with brown on the standard spots, the shield well marked as a long smooth area. Length, $2-2\frac{1}{2}$ mm.

Head yellow, convex, punctured, with dark, finely impressed median line and vertex, eyes distant in both sexes, antennæ red, growing dark towards the tip and reaching the second segment of abdomen in ♂, shorter in ♀; thorax narrowed in front, yellow, moderately and finely brown punctate, transverse impression moderate, M more or less indicated by brown clouds, lateral edge subangulate; elytra yellow, with striæ of brown punctures diffused in the scutellar area and broken in the sixth, seventh or eighth intervals back of the humerus; this break is sometimes quite slight; the ♂'s are much more inclined to regularity than the ♀'s, especially in the punctuation of the scutellar area, which in one example is almost regular, the elytral shield is shown as an elongate smooth raised third interval, running from about the middle down over the edge of the convexity. This is at times supplemented by a similar, though smaller space in the fourth interval. Some of the standard spots show at times as little splashes of brown, marginal stria lightly curved and sinuate behind, lobe well developed, with a small row of marginal punctures; body beneath black, with the epimera, sides of abdomen, last segment and pygidium yellow, legs yellow, with reddish clouds, fossa shallow, dull and triangular.

Three ♂'s, 2 ♀'s, Colorado Springs, Colorado. Type coll., Bowditch.

I also place here examples from Durango, Colorado; Taos County and Coolidge, New Mexico; Winslow, Arizona, and Reno, Nevada. They differ slightly, but all have the prominent smooth space on the third interval. The Coolidge, N. M., specimen has a well-marked M and thickly-punctate thorax.

Pachybrachys Texanus, nov. sp.—Very close to *eburifer*, Suff., and *nebulosus*, Suff., but readily separated by the nearly approximate eyes of the ♂; general colour yellow, with brown or livid markings. Head flat, closely punctured with livid central line and vertex, eyes of ♂ just visibly wider apart than the width of the livid central mark, those of the ♀ a little wider, about the same width as in ♂ of *similis*, nov. sp.; antennæ yellow at base, growing darker towards the tip, reaching about the middle of the body in ♂, not as long in ♀; thorax very finely brown-punctured, a little narrowed in front, sides in ♂ almost straight, ♀ just visibly sub-

angulate; colour yellow, with very broadly suffused M in livid-brown, caused by the crowded punctures, the central forked mark being much less sharply defined than in the preceding species; elytra the same general colour and shape as *similis*, but with the intervals behind the humerus less broken, and the fourth interval is, on the contrary, broken up with punctures. The elytral shield and livid markings are about the same in both species (one of my ♂'s has a specially-developed shield), marginal stria lightly curved at lobe and barely sinuate behind, lobe well developed, especially in ♀, and with a well-marked series of punctures on the curve; below dark brown or livid, with yellow epimera and sides of abdomen, legs pale, with darker clouds, pygidium as in *similis*.

Five ♂'s, 7 ♀'s, Brownsville, Texas. Length, $2-2\frac{3}{4}$ mm.

The main points of difference from *eburifer* are approximate eyes and shorter antennæ in ♂, and elytral striæ differently broken.

Pachybrachys pusillus, nov. sp.—Small, or medium size, dull dirty-yellow, elytra almost regularly punctate striate with a shield. Length, $2-2\frac{3}{4}$ mm,

Head yellow, front convex, punctured, the usual dark lines very faintly indicated in brown, eyes moderately distant in both sexes, antennæ yellow, the last five or six joints separately darkened at the ends, the tip reaching the abdomen in the ♂; thorax yellow, much wider than long, constricted at front and rear, more, however, at the former, so that from above the sides appear rounded, depression obvious, though not deep, surface rather unevenly but thickly punctured, M faintly indicated in livid, sides very feebly subangulate, especially in ♂; elytra yellow, almost regularly, very light brown, punctate striate, with an entire third interval, which shows a well-developed shield; the first short stria next the scutel is irregular; there is also a break in the sixth and seventh intervals behind the humerus; the curve of the marginal stria is very slight and almost straight behind, the lobe is wide, with a well-marked row of punctures; body below yellow, with the middle livid, legs yellow, fossa wide and dull.

♂ and ♀, Brownsville; 2 ♂'s, San Antonio, Texas. Type coll., Bowditch.

The 2 ♂'s from San Antonio are smaller, but do not differ otherwise from the Brownsville examples; specimens from Chihuahua, Mexico, are a trifle larger and more diffusely punctate around the scutel, and show traces of the standard spots in livid, and approximate to *nebulosus*, Suff.

Pachybrachys puncticollis, nov. sp.—Size small, pale yellowish-white, with red-brown markings, very noticeable by the coarse and crowded

punctuation of the thorax and front part of the body and the smooth, shiny, nearly impunctate rear. Length, $2\frac{3}{4}$ mm.

Head convex, thickly and coarsely punctate, with central line, vertex, margins of eyes and spots at base of antennæ red-brown, eyes in ♀ rather close (♂ unknown), antennæ yellow, slightly darkened at tip, short and thin, reaching about the middle of body in ♀, thorax broader than long, much constricted at the front, yellow, with reddish clouds, the three most conspicuous being the bottoms of the standard M, the surface thickly and coarsely reddish punctured, with here and there towards the middle a few very small smooth yellow areas, depression behind well marked, but lobe before the scutel small, sides angulate, very distinctly sinuate in the rear, where the angle is finely rectangular; elytra yellow, with reddish-brown marks, the principal one being a transverse band on the convexity, dilated forward at the suture to meet a broad V, the arms of which fall inside the humerus, the general effect being a brown cross; just anterior to the transverse band is a line of four conspicuous yellow spots, which nearly meet near the suture, another and smaller row coming from the humerus; there is also a rather prominent spot on each side and just back of the scutel; the tip and roots of the intervals are also pale. The punctuation is confused in the scutellar area and backward to the convexity, the striæ are close and crowded, and towards the base show a tendency to become irregular, the sixth and seventh intervals are broken just before the convexity, and the marginal is also irregular, the whole surface is somewhat shiny, but towards the convexity the punctuation becomes less marked, and the surface is as if varnished; the marginal stria is very broadly and lightly curved round the humerus and lightly sinuate behind the lobe, which is very inconspicuous and almost wholly occupied by a row of punctures, all below, red-brown, with paler legs, fossa of ♀ large, deep and round.

One ♀, Chihuahua, Mexico; ♂ unknown. Type coll., Bowditch.

A ♀ specimen from Oak Grove Canon, Arizona, in collection of Prof. Snow, I refer to this species. It is in very bad order, and differs by having the red colour more general and suffused, the punctuation is thicker and more irregular.

Pachybrachys rotundicollis, nov. sp.—Obscure (same colour as *pusillus*) dirty-yellow, striate with black or brown punctures and very black narrow sutural line; thorax of ♂ constricted at both ends, so that viewed from above the sides appear rounded. Length, $3-3\frac{1}{2}$ mm.

Head yellow, convex, with rather coarse punctures and brown frontal line, and faint vertex mark, eyes distant in both sexes, antennæ yellow, growing darker towards the tip, strong and stout in ♂, and reaching about the middle of the abdomen, shorter and finer in ♀; thorax yellow, with scattered coarse brownish punctures, which are thickest where the M would be, transverse depression well marked, especially in the ♀, and with a strong brown depression before the scutel, the ♂ has the thorax constricted in front and behind, most strongly in front, so that the sides, viewed from above, appear almost regularly rounded; the ♀ has the front constricted but very little, narrowed behind, so that the round appearance does not show, sides swollen, lateral edge almost straight in ♂, subangulate in ♀, hind angles obtuse; elytra yellow, stout parallel, constricted behind the shoulders, with striæ of brown punctures, which are regular, except in the scutellar area, and a slight break behind the humerus; the punctures are notably distant, so that the striæ are very little impressed and the intervals flat, the suture is black, the beginnings of a shield are apparent, though not prominent, the marginal stria is moderately curved and sinuate behind the humerus, lobe well developed, especially in ♀, with a fine row of punctures, beneath black with epimera, last segment and sides of abdomen and pygidium yellow, legs yellow, with paler femoral ends, fossa moderately deep and semi-dull.

Martin and Hamilton Counties, Kansas; Greely and La Junta, Colorado, Texas. Type coll., Bowditch.

Pachybrachys atomus, nov. sp.—Small, or medium sized, black, specked with yellow enamel, especially on the elytra. Length, 2-2½ mm.

Head with convex front, yellow, with the usual frontal and vertex marks, more suffused in ♀ than in ♂, very finely punctured, eyes equally distant in both sexes, antennæ long and stout, reaching beyond middle of abdomen in ♂, becoming flattened and therefore apparently thicker towards the end, thorax cylindrically narrowed towards the front, yellow, very finely, thickly and irregularly punctured, with broadly suffused M (the thickness of the M determining the punctuation), slightly depressed behind, sides lightly bowed in both sexes; elytra a little narrower than the thorax, black, covered with comparatively coarse punctures, which are confused over the whole surface; the third, fifth and ninth intervals are more or less plainly indicated, in the typical ♀ they are traceable throughout a good part of their length; a large proportion of the broken intervals over the elytra are raised in yellow enamelled spots, giving the species the appearance of black specked with yellow, of these spots the

most prominent is usually the shield, though some other spots towards the sides are of the same size, but not so prominent at the first glance; the marginal stria is very slightly curved around the humerus and lightly sinuate behind, the lobe is hardly noticeable, and almost wholly occupied by a row of punctures, body below black, legs yellow, with dark rings on the thighs and clouds on the shanks and tarsi.

Three ♂'s, 1 ♀, Douglas County, Kansas; Iowa City, Pennsylvania. Type coll., Bowditch.

In well-marked examples the general appearance is yellow, caused by the numerous raised yellow spots on the elytra; then specimens occur where the yellow areas are few, and it approaches close to *characteristicus*. In general appearance it resembles some forms of *bajulus*, Suff.

Pachybrachys proximus, nov. sp.—Medium sized, or rather large, stout, black, with yellow spotting, always with a small, round shield spot. Thorax very finely and elytra coarsely punctured. Length, $2\frac{1}{2}$ mm.

Head convex, thickly punctured, entirely black, except for two triangular spots between the eyes, a large, rather irregular quadrate spot between the antennæ and the labrum yellow, eyes very distant, antennæ red at base, and becoming dark brown after about the middle, and reaching to or a trifle beyond the middle of the abdomen in the ♂, not so long in ♀; thorax more than half the length of the elytra, tubularly constricted in front, depressed behind and humped about the middle, finely and evenly punctured, black, except the anterior angles, margin narrowly, and a narrow median line to beyond the middle and a small spot on each side at the base yellow, the median line is smooth, antescutellar impression well marked, lateral edge just barely bowed in ♂, angulate in ♀, hind angles obtuse; elytra somewhat compressed behind the shoulders, yellow, with the exterior standard spots suffused so that the two anterior ones are wholly joined, and they connect on the margin with the posterior spot (which otherwise is free), the interior spots are confused together longitudinally, and also spread sideways back of the shoulders and before the convexity to meet the two anterior exterior spots, having a well-marked shield, the keel and spots off from it yellow; the tip and around the hind exterior standard spot is yellow, the punctuation is coarser than the thorax, and everywhere diffuse, even to the tips of the elytra, the third, fifth and humeral intervals are traceable for part of their length, the yellow area at the side is elevated in fragments of ridges, marginal stria very lightly curved at the humerus and almost straight behind, lobe small, black, with a yellow spot forward of the shoulder hump, body beneath black, with

faint spots on the pygidium, prosternum finely sulcate, legs black, brown at base, with white spots on the thighs and rings on the shanks.

One ♂, Natchez, Mississippi; ♀, Falls Church, Virginia, Type coll., Bowditch.

I have five ♀ specimens from various places, where the elytra are almost wholly yellow and a trifle more regular in costation and more broken up into elevated spots, but I think they are all the same species.

North Carolina, Georgia, Pennsylvania, Grand Bay, Alabama.

Pachybrachys varians, nov. sp.—Of the same size and general coloration as *femoratus*, Ol., yellow and black, often more yellow, and broader in shape and much more regularly punctate striate and with a well-marked shield, length 2–2¾ mm.

Head yellow finely punctured, with heavy dark spots on vertex, central line and spots at base of antennæ, often all suffused together, eyes distant in both sexes, antennæ red brown, darker towards the end, reaching the middle of abdomen in ♂, thorax yellow finely punctate, M (typical ♂) usually heavy, strong and well marked and closely punctate, typical ♀ much yellower and M much more faintly marked, transverse depression and lobe in front of scutel, medium, the lateral edge is finely angulate, hind angles fine and obtuse. The elytra (typical ♂) are yellow with the standard spots much diffused, leaving the tip, a row of spots on the convexity, the shield, a row of spots round the humerus and others near the base and scutel yellow, almost regularly punctate striate, except for a slight disturbance round the scutel and a break in the sixth, seventh and eighth intervals back of the humerus, (typical ♀ is much yellower and shows much less suffusion of the standard spots, the rear ones showing as a band and the others very faint, the striation is not quite as regular as in the ♂), body below black more or less picked out with yellow in the usual places, legs yellow with dark rings on all, and light tip on the femora of two hind pairs. The above is what I term the typical form; from this it varies until almost the entire upper surface is yellow either with the standard dark marks very faintly shown in clouds or very distinctly marked in black, the larger ♀'s are quite wide and flat and look very differently from the typical ♂, the smaller and darker forms have a close superficial resemblance to *femoratus*, Ol., but that is never broad and stocky or so regularly punctate striate, nor is the shield ever as well developed; marginal stria very moderately curved and slightly sinuate (same as *femoratus*), lobe the same; below black with spotted sides of abdomen and pygidium.

Nine ♂'s, six ♀'s, Opelousas, La., Georgia.

Some small ♂'s resemble some examples of *bajulus*, Suff. Type coll., Bowditch.

Pachybrachys croftus, nov. sp.—Medium sized, variegated black and yellow, rather smooth and semi-shining, very similar in size and general appearance to *melanostictus*, Suff. Length, $2-2\frac{3}{4}$ mm.

Head yellow, thickly, finely punctured with heavy frontal and vertex marks, eyes distant, antennæ dark red becoming black towards the end, stout and in the ♂ reaching nearly the tip of the abdomen, thorax yellow, somewhat narrowed in front, thickly and rather coarsely punctured, the M taking the form of three heavy black stripes, nearly separate, of which the middle one is entire to the rear margin and divided in front by a narrow median yellow line attaining about the middle, transverse depression well marked, lateral edge subangulate and sinuate behind; the punctuation, while to some extent avoiding the light portions of the thorax, is on the whole, even and thick; elytra yellow, semi-shining, brown punctate, striate, with fairly regular costæ on the rear convexity, the root of the third, most of the fifth and the two side intervals; the standard spots show more or less suffused, the rear ones having rather a tendency to form a band, marginal stria lightly curved and lightly sinuate behind, lobe well developed and mostly occupied with a row of large punctures, body below black with spots on the rear rings of the abdomen and pygidium, legs brown with dark rings and light tips to femora.

Cloudercroft, New Mexico, 15 examples. Type coll., Bowditch.

The extent to which the intervals show on the elytra varies somewhat and in one ♂ others than those mentioned above show, and some do not show as many, but all show about the same behind, the small and most regular ♂'s approach *similaris*, nov. sp., but are not as proportionately long and cylindrical as that form.

I have also 5 examples from the same locality which are almost entirely black and where the punctuation seems closer, but as the black parts of the ordinary forms are always the most punctured, a totally black variety might naturally look more punctured than the type, so I call them for the present identical.

Pachybrachys lævicollis, nov. sp.—Size large, form rather broad, flat, elongate, shining, sparsely and finely punctured, especially on the thorax; black with pale thoracic margin and median line and a few specks of light on the elytra. Length, $3\frac{1}{2}$ mm.

Head yellow with heavy black frontal and vertex marks, sparsely and finely punctate (except on the dark marks); eyes distant (antennæ wanting); thorax much wider than long, narrowed in front, medium depression behind, black with pale frontal and side margins and median line reaching a little beyond the middle and a suspicion of colour on the rear margin; the surface shiny and very sparsely, finely punctate, especially on the disk, lateral edge just barely bowed; elytra elongate parallel, rather square behind, sparsely, finely and diffusely punctate, the punctures coarse at the side, here and there arranged in rows, but only at the side is there any suggestion of costate intervals and then short and poorly defined, colour shining black; with the forward inflexed edge to round the shoulder, the tip, a few spots laterally behind the shoulder, at the convexity and a few median sprinkles, yellow, marginal stria very lightly curved, lobe rather long drawn out with a row of punctures; body below black with the epimera and abdominal and pygidial spots yellow, legs yellow, the tibiæ and tarsi more or less fuscous.

Two ♂'s, Grand Lake, Colorado.

Would be placed near *signatifrons*. Type coll., Bowditch.

I note the occurrence of *eburifer*, Suff., from Brownsville, Texas, also what is apparently *rubronotatus*, Jac., from Iowa and Illinois. Our examples are smaller than the Mexican example cited in Biolog. Supp., p. 137 (which is in my collection), and with less yellow on the thorax and more on the elytra, but the form and punctuation seem to me about the same; more specimens are needed from all localities. Mr. Blanchard has also from Globe, Arizona, a specimen which I call var. of *marmoratus*, Jac. It has the thoracic M very plain and the elytra pallid. Mr. Knaus has two others much darker, one from El Paso, Texas, and the other from Las Vegas, N. M.; the latter gentleman also has a specimen of *varicolor*, Suff., from Cloudcroft, N. M., and *bajulus*, Suff., from Lower California; the latter species I have also seen from Texas; also from Cloudcroft, an example of *hematodes*, Suff. In my former paper (Ent. News) I refer to *striatus*, Lec., dark form as probably a new species. I put it as *nigricornis*, Say.; *characteristicus*, Suff., which is typically dirty white, occurs also almost entirely suffused with black; *Sonorensis*, Jac., is found in the Santa Rita mountains, Lundy and Truckee, California. It is dull, rather flattened above, and comes near *croftus*, n. sp., *brevicollis*, Lec., and *signatifrons*, Mann. A series of specimens occur in Southern

Arizona, which seem to me probably *immaculicollis*, Jac., yet they do not fully agree with my only Mexican example of that form; the Arizona examples are rather more regularly punctate-striate and have a small shield spot; the Mexican specimen has a very indifferent shield and the stria not very well marked.

A NEW SPECIES OF ANISOTA.

BY H. H. BREHME, NEWARK, NEW JERSEY.

Anisota Neomexicana, n. sp.—Male:—Expanse, 50 mm. Head and body, ochreous-brown. Fore wings dark ochreous-brown, shaded slightly darker outside the extradiscal line. Extradiscal line faint, purplish-brown in colour, more distinct toward inner margin; begins on the costa near the apex and extends in an even outward and inward sweep three-fourths across the wing, then with another outward and inward curve reaches the inner margin about one-third the length of the inner margin from the anal angle. Discal spot white, large, round and conspicuous and surrounded with a dark ring. Hind wings purplish-red with brownish cast at base and at inner margin. Beneath, rather evenly purplish-red, but paler than upper surface of hind wings and with an ochreous cast at base of both wings and on costal area of fore wings. Discal spot of primaries feebly reflected.

Female:—Expanse, 64 mm. Head and body uniform ochreous. Fore wings very soft grayish-brown with a distinctly ochreous tinge. Extradiscal line faint and diffuse, pale purplish in colour, running in the same manner as in the male. Discal spot white, large and round. Ground colour of hind wings as in fore wings, but with a purplish tinge, especially centrally. A single broad, faint and diffuse line extends straight from the above outer angle on costa to a little below the centre of the inner margin. Beneath ground colour as above, without the ochreous tinge, but with a decidedly purplish cast throughout. Lines of upper surface very faintly reflected.

Habitat: Fort Wingate, New Mexico, June 29. Described from six males and ten females. Allied to *Anisota suprema*, Pack., but differs in the colour of the abdomen, which in *Neomexicana* is ochreous, not black as in *suprema*, and in the male by the hind wings being purple instead of black.

A NEW STAPHYLINID GENUS FROM CALIFORNIA.

BY A. FENYES, PASADENA, CAL.

During a recent collecting trip, I came across about 40 specimens of a very odd-looking Staphylinid ; the beetle was living in the nest of the common red and black ant, under boards in the back yard of the Gally Cottages in Nordhoff, California. I spent a whole morning in removing the boards and following the crowds of ants, and was rewarded, aside from the above-mentioned specimens, with another specimen of a new inquilinous Staphylinid, also belonging to Aleocharinæ subfamily. This unique specimen will have to be left unnamed until further material will allow the study of the mouth parts.

This is the first time, to my knowledge, that guests of the common ant of our State have been found ; possibly the aggressiveness of this ant has kept collectors from exploring the more hidden parts of the nests.

Following is the description of the new genus and the unique species belonging to the same :

SYMBIOCHARA, gen. nov. (Subfamily Aleocharinæ).

Related to Apterionina, Wasm., and to Sceptobius, Shp.; more robust than the former, with larger elytra and shorter antennæ and legs ; without sexual differences on antennæ or legs, differing in this respect from Sceptobius ; body apterous.

Antennæ eleven-jointed, closely articulated from the third joint on ; joints one and eleven long, robust, subequal ; two and three obversely conical, longer than wide ; four to ten gradually longer, the former transverse, the latter quadrate.

Head moderately large, transverse, rounded ; eyes small, somewhat approximated to the oral parts.

Labrum not clearly visible, possibly obsolete ; mandibles simple, pointed ; mentum very transverse, feebly bisinuate at apex.

Inner lobe of the maxillæ membranaceous, corneous only narrowly along the outer margin, inner margin at apex with about six comb-like spines, towards the base with numerous hair-like spines ; outer lobe almost entirely membranaceous, transparent, longer than the inner lobe, with delicate hair-like spinules at the apex.

Maxillary palpi four-jointed ; joint three long, thick, cylindrical ; four rather short, very thin.

Ligula seemingly very short, consisting only of two very small divergent lobes.

Labial palpi three-jointed, the joints subequal, gradually decreasing in thickness.

Middle coxæ narrowly separated.

Front tarsi four-jointed ; joint one elongate, as long as two and three together ; four as long as one.

Middle and hind tarsi five-jointed ; joint one very long, longer than two to four together ; five about as long as three and four together.

Symbiochara lativentris, n. sp.—Rather broad, moderately convex, gradually wider towards the abdominal apex.

Head castaneous, shining ; prothorax darker castaneous, shining ; elytra and abdomen castaneous-piceous, opaque ; antennæ and legs yellow.

Antennæ moderate, a little longer than the head and prothorax together, almost imperceptibly incrassate towards apex ; joint 1 long, thick, much longer than wide ; 2 shorter than 3 ; 4-10 almost equally wide ; 11 almost longer than 9 and 10 together.

Head almost as wide as the prothorax, a little narrower in front than behind ; on the front vaguely impressed ; almost invisibly, very sparsely punctate, very sparsely pubescent ; eyes small, much shorter than the tempora ; genæ not margined.

Prothorax narrower than the elytra, transverse, subquadrate, widest near the apex, sides hence subparallel, hind angles rounded ; often broadly depressed on almost the entire disc, and with two round, subbasal impressions nearer to the sides than to each other ; almost invisibly, very sparsely punctate, not very densely pubescent, with numerous stiff, short black hairs on the disc and the sides.

Elytra almost shorter, and at base about one-fifth wider, than the prothorax ; sides divergent towards apex ; together much wider than long ; the sutural margin shorter than the lateral one ; very finely and very densely punctate, with dense silky pubescence and with a few stiff black short hairs on the disc.

Abdomen oval, widest at about the sixth dorsal segment, where it is much wider than the elytra ; segments not impressed transversely at the base ; very finely and very densely punctate, with dense silky pubescence and a few stiff black short hairs on the segments and on the rather narrow margin.

Legs elongate, slender, all their parts elongate.

Length, 2.3 mm.

Nordhoff, Southern California.

This species was first discovered by the late G. R. Crotch. Several specimens are in the Hubbard and Schwarz collection.

NOTES ON TENTHREDINOIDEA, WITH DESCRIPTIONS OF NEW SPECIES.

BY S. A. ROHWER, BOULDER, COLO.

PAPER VI. — WESTERN MACROPHYÆ.

Through the kindness of Prof. C. F. Baker I have had the opportunity to study a number of species of Macrophyæ which were collected in California. All these are short (6 to 8 mm.), robust, and largely black. The clypeus in all of them is black, or the apex is pale, and in most of the specimens the clypeus is truncate. The antennæ are short, stout, the third joint is longer than the fourth, and the apical joint in some cases is very small. The venation is normal, the lanceolate cell has a short straight cross-nerve. The scutellum is black or marked with yellow. In the following table I have incorporated a few species from the West, which I have not seen; some of these may not belong to this group, but from the descriptions it is impossible to tell. Until these species have been studied it is not desirable to go into details about the limits of this group. The species which are placed from descriptions are marked with a star:

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Females | 1. |
| Males | 9. |
| 1. Most of the dorsal abdominal segments with the apical margin pale. 2. | |
| All of the dorsal abdominal segments black (the apical segment is sometimes pale) | 6. |
| 2. Posterior coxæ entirely black; (venter black) ... <i>pluricinctella</i> , Roh. | |
| The tips of the posterior coxæ always pale | 3. |
| 3. Clypeus distinctly notched; (venter black) | <i>melanostoma</i> , Roh. |
| Clypeus truncate or but slightly incurved | 4. |
| 4. Venter black; (length, 7 mm.; spot on the scutellum and the upper side of the posterior legs white) | <i>pluricincta</i> , Nort.* |
| Venter largely white | 5. |
| 5. Posterior femora on the inside only black; no shining area behind the lateral ocellus; anterior margin of the clypeus pale; abdomen dorsally with distinct scattered punctures | <i>Doanei</i> , Roh. |
| Posterior femora black on the inside and outside, pale above and beneath; a shining area to the side and behind each lateral ocellus; clypeus black; abdomen dorsally without distinct scattered punctures | <i>multicincta</i> , Roh. |

6. Venter largely black ; (inside and outside of the hind femora at the base black) *truncata*, Roh.
Venter largely pale 7.
7. Scutellum black ; "abdomen smooth and polished" ; posterior femora black *annulipes*, Cress.*
Scutellum with a pale spot ; abdomen not polished ; posterior femora in part pale 8.
8. All the femora pale, with a black line above *nigricornis*, Roh.
All the femora black all the way around at the base. *Provancheri*, Roh.
9. Venter and the sides of the abdomen entirely black 10.
Venter or the sides of the abdomen pale 13.
10. Coxæ entirely black 11.
Coxæ pale beneath at the apex 12.
11. Hypopygidium with a slightly-rounded notch at the apex ; (posterior legs pale above) *Bakeri*, Roh.
Hypopygidium not notched, rounded *occidentalis*, Roh.
12. Sides of the dorsal abdominal segments with pale bands ; legs pale above, black beneath *pluricincta*, Nort.*
Dorsal segments all black ; femora pale beneath *nigricornis*, Roh.
13. Scutellum in part pale 14.
Scutellum entirely black ; (central part of the basal plates polished ; all the femora and the tibiæ with a black line above .. *Doanei*, Roh.
14. Posterior femora black, with a pale line above and beneath ; (stigma white at the base) *pluricincta*, Nort.*
Posterior femora at the base entirely black ; (sides of the abdominal segments pale ; stigma yellow, bordered with a black line) *albipes*, Prov.*
Posterior femora entirely pale beneath ; stigma black above and pale beneath ; the central part of the basal plates with distinct punctures) *truncata*, Roh.

Macrophya Provancheri, n. nom.

Macrophya albipes, *Prov.*, Nat. Can., XXII, p. 95, 1895, not *Tenthredo* (*Macrophya*) *albipes*, *Dahlb.*, Conspect., Tenth. Scandin., 1835, p. 12, n. 162.

It seems quite probable to me that Provancher had confused two species when he described *albipes*. The male does not seem to be the male of the female described. It differs in having the sides of the abdominal segments pale. In all the species of this group which I am familiar

with the male is coloured almost exactly like the female. A single female collected in the mountains near Claremont, Calif., by Prof. C. F. Baker, seems to be the female of this species. Provancher does not say that the coxæ are pale, but implies that they are; if this is the case, the female from California is not Provancher's species. The above-mentioned female may be briefly characterized as follows:

Clypeus truncate; the labrum not much exceeding the clypeus. The third antennal joint is as long as joints four and five. Lateral ocellar furrows present, but not strong, deepest a little behind the lateral ocelli, where they are shining. Orbital carina* not very strong, in places wanting. All the lobes of the mesonotum punctured alike. The teeth of the claws about of equal length. Dorsal abdominal segments without large punctures, the apical segments finely punctured; the apex of the sheath obliquely truncate. Black; tegulæ, margin of the pronotum, spot on the scutellum, posterior margin of the basal plates, and the apical abdominal segment *yellowish-white*. Legs black; tips of the posterior coxæ beneath, trochanters, apices of the femora, tibiæ, except the apex (the anterior pair have a narrow black line above) and most of the tarsi *yellowish-white*. Wings hyaline, slightly yellowish, iridescent; venation black, stigma brownish.

The species here described may be taken as the type of *Provancheri*, and if different from Provancher's species, that species should be given a new name.

Macrophya nigricornis, n. sp.—Female: Length, 5.5 mm. Anterior margin of the clypeus truncate; labrum but slightly projecting, its apical margin slightly incurved. Supraclypeal fovea transverse and shining; middle fovea wanting, lateral ocellar furrows rather distinct, a distinct fovea behind each lateral ocellus; orbital carina evident. The third antennal joint not quite as long as joints 4 and 5. Mesonotum with rather scattered punctures; the punctures of the scutellum larger and somewhat more scattered; scutellar appendage shining, but finely granular. The inner claw-tooth shorter than the outer. Dorsal abdominal segments finely sculptured; the apical margin of the sheath obtuse, rounded. Black; some of the joints of the palpi, posterior margin of the pronotum, tegulæ, a spot on the scutellum, posterior margin of the basal plates, and the apical abdominal segment *whitish*. Legs whitish; bases of the coxæ

*The orbital carina is the carina running along the posterior margin of the head, from the clypeus to the occiput.

(more broadly so above), a line on the femora above, a line on the four anterior tibiae and tarsi above, and the apex of the posterior tibiae (the posterior tarsi are wanting) *black*. Wings hyaline, iridescent; venation black, stigma with a narrow orange-coloured line.

Male: Length, 5 mm. The male differs from the female in having the antennae longer, the claws not nearly so deeply cleft; the scutellar appendage is not so granular; the scutellum is black, the trochanters and the posterior tibiae have a black line above. The stigma is brownish, and the posterior tarsi are black. The hypopygidium is rounded at the apex, not notched.

Type locality: Mountains near Claremont, California. A male and female collected by Prof. C. F. Baker. The female is in Baker's collection, the male is in the author's.

This species is near *Provancheri*, Roh., but the femora have a black line above (they are not black all the way around at the base).

Macrophya occidentalis, n. sp.—Male: Length, 5 mm. Clypeus rather short, the anterior margin incurved; the labrum about as long as the clypeus, its anterior margin incurved. Supraclypeal fovea transverse, shining; middle fovea linear, not well defined; lateral ocellar furrows deep and narrow to the ocelli, but below the ocelli they are very weak; orbital carina not strong. The third antennal joint is shorter than joints 4 and 5. The lateral lobes of the mesonotum are more densely punctured than the anterior one; the scutellum with larger, more scattered punctures; the scutellar appendage is opaque, perhaps it is granular; tarsal claws minutely cleft. Dorsal abdominal segments punctured and granular, but not coarsely so. Hypopygidium rounded at the apex, not notched. Black; narrow posterior margin of the pronotum, and the margin of the tegulae *whitish*. Legs black; four anterior femora (not to the base) and the tibiae, posterior femora above and beneath (not extending to the base), posterior tibiae, except at the apex, and the four anterior tarsi more or less *yellowish*. Wings hyaline, iridescent; venation dark brown, the lower part of the stigma pale.

Type locality: Claremont, California. One male, collected by Prof. C. F. Baker.

This species is related to *nigricornis*, Roh., but the labrum is about as long as the clypeus (in *nigricornis* it is much shorter), and the legs are different colour, as shown in the above table.

Macrophya Bakeri, n. sp.—Male : Length, 6 mm. Clypeus with a deep V-shaped notch at the apex, the lobes broad ; labrum about as long as the clypeus, and notched like it. Supraclypeal fovea shining, not well defined ; middle fovea wanting ; lateral ocellar furrows deep and narrow to the ocelli, where they become broad and shallow ; the orbital carina almost wanting. Antennæ stout, the third joint as long as joints 4 and 5 ; joints four and five narrowed at the base. All the lobes of the mesonotum with about the same sculpture ; scutellum a little more sparsely than the mesonotum ; the scutellum appendage roughened ; tarsal claws about equal. Dorsal abdominal segments very finely sculptured, shining. Hypopygidium slightly but distinctly notched at the apex. Black ; a white spot on the labrum ; a narrow line on the pronotum and the tegulæ, and the posterior margin of the basal plates *yellowish*. Legs black ; the four anterior legs from near the base of the femora beneath, the posterior femora and the tibiæ, except the base and apex, above yellow. Wings hyaline, iridescent ; brown and black, the stigma pale brown.

Type locality : Claremont, California. One male, collected by Prof. C. F. Baker.

Macrophya truncata, n. sp.—Female : Length, 5 to 6 mm. Anterior margin of the clypeus truncate ; the labrum not more than half as long as the clypeus, at the apex truncate. Supraclypeal fovea shining, not distinctly defined ; middle fovea distinct, circular ; lateral ocellar furrows distinct above the antennæ and near the ocelli, in the other places poorly defined ; orbital carina not strong. The third antennal joint about as long as the 4 and 5 joints combined. The punctures of all the lobes of the mesonotum about the same ; the punctures of the scutellum larger and more scattered ; scutellar appendage punctured ; the tarsal claws with teeth about equal. Dorsal abdominal segments with rather large distinct punctures, closer in some specimens than in others ; sheath rounded at the apex, the lower margin somewhat oblique. Colour black ; anterior margin of the clypeus cream-coloured ; posterior margin of the pronotum, tegulæ, spot on the scutellum, a spot on the pleuræ, most of the basal plates, apical dorsal segments and most of the venter *yellow*. Legs yellow ; coxæ (the posterior pair beneath pale), trochanters, base of the femora (broadly so above), tips of the tibiæ and most of the tarsi *black*. Wings hyaline, slightly dusky, iridescent ; venation dark brown, lower part of the stigma pale brown.

Male : Length, 5.5 to 6 mm. The male differs from the female in the absence of the pale spot on the pleuræ, and the black of the femora is

more extended. The hypopygidium is rounded at the apex and entire. The male varies in size; the size of the pale spot on the scutellum also varies; the width of the yellow on the pronotum is not constant; the clypeus is sometimes all black; and the posterior tibiæ sometimes have a narrow black line above.

Type locality: Claremont, California. Five males and eight females, collected by Prof. C. F. Baker.

This species is close to *annulipes*, Cress., but the venter, scutellum and tips of the posterior coxæ beneath are yellowish; and the abdomen has distinct punctures—it is not “smooth and polished.”

Macrophya Doanei (Roh.)—*Labidia Doanei*, Roh. (CAN. ENT., p. 91, March, 1909), in part.

The apical antennal joint is very small. The type was collected at Stanford University, California. I have seen three females collected by C. F. Baker at Claremont, California. Two of the females have a small pale spot on the scutellum. A male from Claremont, California, and a male from the mountains near Claremont, collected by C. F. Baker, differ from the female in having the bands on the dorsal abdominal segments interrupted in the middle. The hypopygidium is rounded at the apex and entire.

Macrophya pluricinctella, n. sp.—*Labidia Doanei*, Roh. (CAN. ENT., p. 91, March, 1909), in part.

Female: Length, 6 to 7 mm. Anterior margin of the clypeus very gently incurved; labrum fully as long as the clypeus, truncate at the apex. Superclypeal fovea almost wanting; middle fovea wanting; lateral ocellar furrows almost reduced to a fovea; orbital carina strong; head behind the ocelli more shining and more sparsely punctured than on the front. The third antennal joint as long as joints 4 and 5. All the lobes of the mesonotum closely punctured, the scutellum more sparsely so; scutellar appendage punctato-granular; the tarsal claws deeply cleft, the inner tooth somewhat the shorter. Abdomen very finely punctured, the sheath rather broader than usual, rounded at the apex. Black; posterior part of the pronotum, tegulæ, scutellum (sometimes reduced to a small spot), edge of the basal plates and the posterior margin of all the dorsal abdominal segments (these lines are sometimes interrupted), *yellowish-white*. Legs black; the apical 5/6th of all the femora beneath, the entire tips of the femora, tibiæ (the anterior pair have a black line above, and the posterior pair have a black ring at the apex), and the tarsi (more especially the

anterior ones), *yellow*. Wings hyaline, iridescent; the venation black; the stigma brown, the lower part paler.

Habitat: Palo Alto, California; Stanford University, California; Claremont, California (C. F. Baker).

This species is close to *pluricincta*, Nort., but the coxæ are entirely black, and the femora are darker.

Macrophya múlticincta, n. sp.—Female: Length, 7 mm. Anterior margin of the clypeus truncate; labrum smooth, slightly notched at the apex, not as long as the clypeus. Supraclypeal fovea shining, not well defined; middle fovea sublinear, fairly well defined; lateral ocellar furrows distinct behind the ocelli and above the antennæ, in the other places almost wanting; a distinct furrow extends both forward and backward from the anterior ocellus; orbital carina rather faint; head behind the lateral ocelli shining and more sparsely punctured than on the front. The third antennal joint not quite as long as joints 4 and 5 combined. The sculpture of all the lobes of the mesonotum the same; the scutellum more sparsely punctured; the scutellar appendage granular; the tarsal claws deeply cleft, the teeth equal. Abdomen with some distinct, irregular punctures; sheath truncate. Colour black; posterior margin of the pronotum, tegulæ, a spot on the scutellum, most of the basal plates, line on the posterior margin of all the abdominal segments, and most of the venter *whitish*. Legs black; posterior coxæ beneath, posterior trochanters, the femora above and beneath (these lines do not always reach the bases of the femora), four anterior tibiæ, except a black ring at the apex beneath, posterior tibiæ in the middle, and the tarsi more or less, *whitish*. Wings hyaline, iridescent; venation brown, the stigma with a pale streak.

Type locality: Claremont, California. Three females, collected by Prof. C. F. Baker.

This species is closest to *pluricinctella* and *pluricincta*.

Macrophya melanostoma, n. sp.—Female: Length, 7.5 mm. Anterior margin of the clypeus with a V-shaped notch, the lobes broad and obtuse; labrum punctured with small punctures, the apex truncate, as long as the clypeus. Superclypeal fovea almost wanting; middle linear; lateral ocellar furrows distinct, deeper at the vertex and the antennæ; orbital carina almost wanting; head behind the lateral ocelli shining, but not so much so as in some of the preceding species; third antennal joint as long as joints 4 and 5. Sculpture of all the lobes of the mesonotum the same;

scutellum with larger and more scattered punctures ; scutellar appendage granular ; the tarsal claws have the inner tooth shorter and stouter. Abdomen finely sculptured, the sheath rounded below. Black ; posterior margin of the pronotum, tegulæ, a small spot on the scutellum, most of the posterior plates, narrow posterior margin of all the dorsal abdominal segments *yellowish*. Legs black ; tips of the posterior coxæ beneath, the apices of the femora (more broadly beneath), the anterior tibiæ, except a black line above, the four posterior tibiæ, except the apex (there is a small spot at the base of the intermediate tibiæ), and the tarsi more or less, *yellow*. Wings hyaline, iridescent ; venation black, stigma pale brown.

Type locality : Claremont, California. One female, collected by Prof. C. F. Baker.

This may be the female of *Bakeri*, but the colour is different, and as the males of the other species resemble the females very closely, I think it is best to give this form a name.

NOTES ON BEES.

BY T. D. A. COCKERELL, UNIVERSITY OF COLORADO.

Anthophora occidentalis, Cresson.—At Pecos, New Mexico, July 15, my wife found a male which had been captured and killed by a Thomisid spider, *Misumena vatia*. The spider was much smaller than the bee ; cephalothorax and legs pale green, abdomen white, marked with pink.

Dioxys aurifuscus (Titus).—This very rare bee was found by Mr. E. Bethel in a nest of cottony tomentum, evidently made by a species of *Anthidium*, on which it must be parasitic. The *Anthidium* nests occur at Golden, Colorado, in amygdaloid cavities in the basalt, these cavities being "filled with crystals called zeolites," in the search for which the nests were discovered.

Perdita salicis, Ckll.—On July 3, 1908, Mr. S. A. Rohwer took three females at Rifle, Colorado ; two have the abdomen unusually dark, like males. The species is new to Colorado.

Tetralonia speciosa (Cresson).—In Lee County, Texas, Mr. Birkmann has taken both sexes in numbers at flowers of *Scutellaria*, April 28 and 29. The male is *T. Gillettei*, Ckll., which falls as a synonym. Confusion arose from the wrong male being associated with *speciosa* in collections.

Halictus similis, Smith.—Owing to the discovery in America of various closely allied species of black *Halictus*, difficulty has arisen

concerning the precise identity of *H. similis* and *H. discus* of Smith, the descriptions of which proved inadequate. I have just taken occasion to re-examine the types at the British Museum, and after very careful comparisons I conclude that *H. similis* is identical with the European *H. leucozonius*. With the type in my hand, I fail to appreciate the differences mentioned by Smith, or to discover any means of separating the two.

The following table separates the females of *H. similis* and *H. discus* from species which they closely resemble :

Area of metathorax large, with irregular raised wrinkles; mesothorax densely punctured (Japan).....	<i>proximatus</i> , Sm.
Area of metathorax strongly longitudinally ridged.....	1.
1. Larger; mesothorax very shiny, with strong sparse punctures; scutellum with large punctures, but a large area on each side of middle impunctate; basal hair-bands conspicuous; hind spur with about four short triangular teeth	<i>discus</i> , Sm.
Smaller; mesothorax densely punctured.....	2.
2. "Disc of basal segment of abdomen shining and remotely punctured" (E. Saunders)	<i>zonulus</i> , Sm.
Disc of basal segment of abdomen finely and closely punctured all over.....	<i>leucozonius</i> , Schr. (<i>similis</i> , Sm.).

In the male, according to Mr. E. Saunders, the tarsi are entirely black in *H. zonulus*, while they have the basal joints pale in *H. leucozonius*.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Entomological Society has held its regular fortnightly meetings during the College year. The first meeting of the fall term was held on October 21st, and the last meeting of the spring term on March 17th.

At all the meetings the student body was well represented, especially by the members of the senior years, many of whom gave most interesting and valuable papers on subjects pertaining to the investigational work they were carrying on for their Fourth-year Thesis, or to the work in Entomology at which they were employed during the summer vacation. The preparation of these papers was entered into with enthusiasm by the students, who were glad to avail themselves of the opportunity of placing the results of their labours before an appreciative audience. The practice obtained in preparing such papers and delivering them in an acceptable manner, is invaluable to the student of Entomology who desires to fit

himself for teaching or investigational work. Thus, the meetings of the Society are of great value to the College students, as well as to all the members. Throughout the entire year great interest was taken in the meetings by all the members, and the prospects of future meetings are bright, as the success of each year stimulates the members to greater efforts for the next.

Some idea of the instructive, comprehensive and highly scientific nature of the work undertaken by the members of the Society during the past year may be gained from the following list of papers read :

"The Sorghum Midge in Louisiana," by R. C. Treherne (4th-year student).

"A Classification of Muscoidean Flies," by W. R. Thompson (4th-year student).

"Rearing Pomace Flies," by E. W. Stafford (4th-year student).

"Suggestions for Field Inspection," by R. C. Treherne (4th-year student).

"Notes on Eriophyidae," by J. Tothill (3rd-year student).

"Memoir of the late Dr. Fletcher," by Dr. C. J. S. Bethune (Professor of Entomology).

"Some Notes on Mites," by T. D. Jarvis (Lecturer in Entomology).

"The Chalcidid Subfamily Encyrtineae," by Alfred Eastham (4th-year student).

"Remarks on the External Anatomy of Chalcids," by A. C. Baker (2nd-year student).

"The Genus *Tetranychus*," by R. C. Treherne.

"The Entomological Department at Macdonald College," by A. G. Cutler (4th-year student).

"Spiders," by Dr. C. J. S. Bethune.

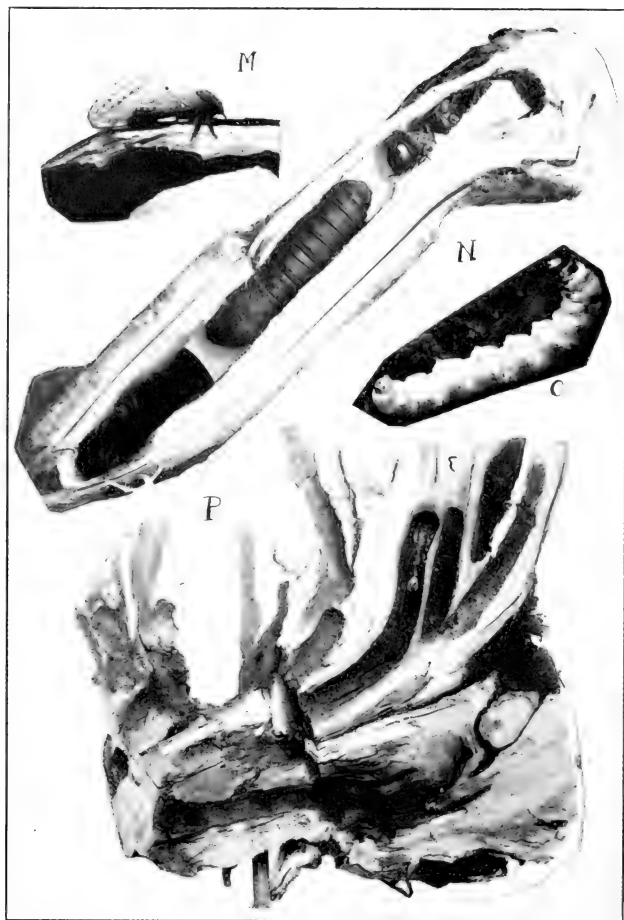
"Injurious Insects of the Season," by L. Caesar (Demonstrator in Entomology).

While all the above papers were of a high order of excellency, the systematic papers by Messrs. Thompson, Eastham, Baker and Tothill are especially worthy of commendation, as they were the outcome of original and thoroughly scientific investigations.

The "Memoir of the late Dr. Fletcher" was given by Dr. Bethune at the special request of the members of the Society, who felt that they would like to be brought into closer touch with the life of their much lamented President, by one who had been his co-worker and intimate friend for so many years. It is needless to say that their desire was fulfilled in a kindly and sympathetic manner.

J. E. HOWITT, Sec.-Treas.

Mailed September 15th, 1909.



STHENOPIS THULE.

The Canadian Entomologist.

VOL. XLI.

GUELPH, OCTOBER, 1909.

No. 10.

NOTES ON THE LARVA AND PUPA OF *STHENOPSIS THULE*, STRECKER.

BY J. M. SWAINE, MACDONALD COLLEGE, P. Q.

Larvæ and pupæ of this interesting species were found in a willow swamp near Macdonald College by Mr. G. Chagnon, Mr. W. Brittain and myself on June 29th, 1909. They were taken from the bases of the stems of the common swamp willow, *Salix petiolaris*, Smith.

So far as we know, the mature larva and pupa have not been previously described.

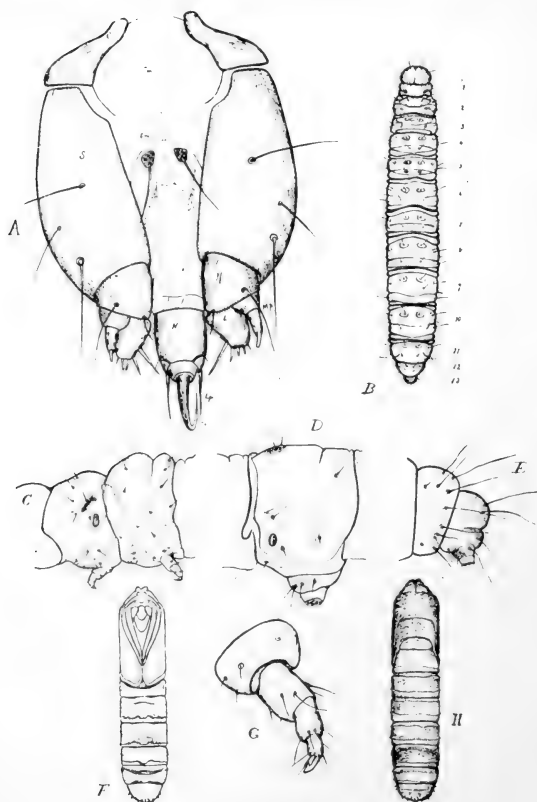
Description of a nearly-mature larva: Length (alcoholic specimen), 70 mm.; diameter at second abdominal segment, 9 mm.; width of head, 5 mm. The shape is nearly cylindrical, the thorax is slightly humped, and the last two abdominal segments are somewhat retracted ventrally. The colour is white or yellowish-white with yellow, chitinized thoracic areas and with small yellow-chitinized spots, from which arise the setæ. The setæ are sparse, dark brown, and longer and stouter on the last two abdominal segments. The body segments are much folded transversely, with a strong lateral fold on each side.

The spiracles are black, distinct, and situated on the first thoracic and first eight abdominal segments.

The abdominal feet are stout, situated on the third, fourth, fifth, sixth and last abdominal segments.

The head is reddish-brown, darker cephalad; with the labrum, mandibles and palpi black; irregular furrows radiate from the sparse, setigerous punctures. The spinneret is slender, straight, and usually held at right angles to the body, though capable of being retracted flat against the ventral wall of the head. The ocelli are six in number, and are arranged in two more or less distinct rows.

The yellowish-brown cervical shield covers the dorsum of the first thoracic segment between the spiracles. Above the spiracles on either side is a slightly-curved, elongate, brownish-black, impressed marking, bearing a black setigerous puncture at either end and one cephalad of the middle.

FIG. 10.—*Sthenopis thule*.

The anal plate is strongly chitinized, and bears stout, black setæ, as shown in figs. E and K.

The chitinized dorsal areas, arrangement of setæ, and other details, are shown in the accompanying figures.

The smallest larva differs from the above description in the relatively

longer and blacker setæ, and in having the yellow, basal plates of the setæ replaced by relatively larger, well-defined, and very distinct blackish areas.

We have obtained, since the flight of the adults ended, larvæ with the following widths of heads: 2 mm., $3\frac{1}{3}$ mm., $3\frac{3}{4}$ mm., $4\frac{1}{4}$ mm., $4\frac{3}{4}$ mm., 5 mm. The length of the smallest specimen is 19 mm., the diameter $2\frac{1}{4}$ mm. These measurements are taken from alcoholic specimens.

We are breeding the larvæ in the greenhouse in the entire willow roots and in pieces of the roots, and hope eventually to be certain of the length of the larval life. At present, allowing for the varying size of pupæ

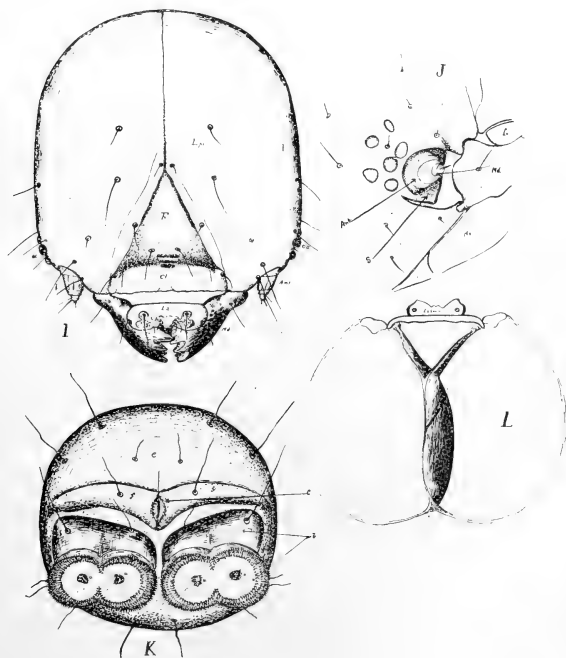


FIG. 11.—*Sthenopsis thule*.

and adults, I suspect that the larval life will be found to extend over three years at least.

Habits of the Larvæ.—The early habits of the larvæ have not yet been discovered. The smallest specimens obtained by us dropped from the roots or stems, and their location could not be determined. All the larger larvæ were within the tunnels in the base of a stem, or in the main stem mass. Each larva cuts a tunnel, seldom over six or eight inches in length, nearly cylindrical, and of a diameter slightly larger than that of the larva. The tunnels of all the larger larvæ have the exit-hole, which is usually below the surface of the ground, already cut a year or more before the maturity of the larva. The tunnels end abruptly inwards, and are sharply angled just within the exit-hole.

The food of the caterpillar seems to be obtained entirely by enlarging the tunnel; short side tunnels are sometimes present. The relatively small amount of food to be obtained in cutting such a tunnel would indicate a long larval life.

The burrow seems to be kept perfectly clean until near the time of pupation. Then the larva frequently forms within the mouth of the burrow, or in the loose soil just below the surface of the ground, a cylindrical cocoon of pieces of decayed bark and roots fastened with silk, of which latter it has a copious supply. All the cocoons found were open at the ends, not over three inches in length, and usually somewhat larger at one end than the other. Several pupæ have been found within the tunnels without any trace of a cocoon.

The larvæ are extremely active, and wriggle vigorously when disturbed, emitting a large amount of dark brown saliva. They even attempt to bite one's fingers when held, and although not very successful in the attempt, their intentions are very evident. When disturbed in their burrows they move backwards or forwards very rapidly. When allowed to wander at will over a black cloth a thread of silk is seen to be spun wherever the larva goes. The head is waved from side to side, and the silk attached to the cloth at the end of each motion, thus leaving the silk attached in a zigzag line. When left in a box with fresh roots and rubbish, the latter is soon interwoven with a web of silk, and the roots are readily fed upon, an evident attempt being made to construct a tunnel.

When kept in a tin box a larva would frequently produce a sharp rattling sound, such as could be produced by a quick succession of blows

of its strongly-chitinized head against the tin. The sound invariably ceased when the box was touched, or even when one walked near it. Probably this species has the habit observed in the case of *Hepialus sequoiolus* (Williams, 1905, Ent. News, 16 : 284).

The larvæ were not noticed to mutilate each other when kept together, as those of *H. sequoiolus* are known to do (Williams, 1905, Ent. News, 16 : 20).

The larvæ and pupæ are to be found chiefly in the bases of healthy and dying stems, although the main mass of the stem will usually be found pierced by numbers of old tunnels. The larvæ apparently worked mainly in the younger tissue near the surface of the ground.

Several parasitized pupæ were obtained, but the ichneumons contained therein died in the pupal stage. No other parasites were found.

Description of the pupa: The length varies from 3 to 4 cm., the width from 7 to 8 mm.; colour dark reddish-brown, with head and dorsum of pro- and mesothorax black. The shape is cylindrical; the wings, legs and antennæ adhere closely, the thorax and abdomen are equal in width, and the sides are almost exactly parallel. The head tapers to a rounded point ventrally; the abdomen is broadly rounded behind. A very few inconspicuous yellow hairs are scattered over the surface. The head is very strongly chitinized, black, with flexuous corrugations, and with four irregular prominences and a median sulcus dorsally. This sulcus gives off a branch on each side which runs cephalo-ventrad behind each anterior prominence. Along these lateral sulci the cuticle splits upon transformation.

The prothorax is very strongly chitinized, black, and strongly, longitudinally corrugated dorsally, with a distinct median carina, more strongly marked cephalad. This carina is a continuation of the line of the dorsal sulcus of the head, and is continued as a narrow smooth line across the meso- and metathorax. The cuticle splits along this line at transformation. The mesothorax and metathorax are also strongly chitinized and corrugated dorsally, more strongly on the sides of the disc. The corrugations are transverse on the middle of the disc and irregular on the sides. The colour becomes lighter behind. The wings extend less than one-half (17/39) the length of the pupa. The tips of the third pair of legs project caudad between the tips of the wings. The first six abdominal segments are transversely and finely corrugated, more strongly cephalad. The

corrugations of the last two segments are faint and irregular. The spiracles are distinct at the sides of all the abdominal segments excepting the first.

The abdominal segments from the third to the seventh bear each two parallel and toothed carinae across the dorsum. The anterior of these is situated at a short distance from the anterior margin of the segment, and begins (see 7th) on each side immediately cephalad and slightly ventrad of the spiracle. The posterior carina is parallel with the first, on the fourth, fifth and sixth segments, and extends in an irregular line across the venter. It is bent strongly caudad and considerably raised on the mid-ventral line. On the third and seventh segments the posterior carina is indistinct. The anterior carina of the seventh segment is continued across the venter, bent strongly caudad and strongly raised. The last segment is hemispherical, marked by several more or less distinct, concentric carinae, scattered tubercles, and a slit-like protuberance at the tip. The armature just described is undoubtedly of great assistance to the remarkably active pupa in working its way from the burrow or from the cocoon previous to transformation. The pupal skins are usually found projecting amongst leaves and rubbish on the surface of the ground near the mouth of the burrow, which is usually at or slightly below the surface. Sometimes, however, the pupal skins are found within the mouth of the tunnel.

During transformation the cuticle splits along the Y-shaped sulci on the dorsal surface of the head and along the line mentioned before as extending across the head and thorax. The split ends at the first abdominal segment. On the venter the cuticle usually splits on the middle line as far as the middle of the fourth abdominal segment. The somewhat triangular portion of the cuticle covering the antennae, eyes and bases of the palpi is invariably broken off.

The length of the pupal period is at least twelve days. A pupa, apparently recently pupated, was obtained June 28th, 1909. The adult emerged twelve days later at 5 p.m.

We frequently collect the adults in the early evening (6 to 8 p.m.) by picking them from the bases of the willow stems, where they rest, head upwards, about six inches from the ground. Very often a number of wings, usually perfect, will be found at the base of the clump of willows, with the body completely vanished. The pupal skin is usually nearby. The robbers were not discovered, but doubtless mice are responsible.

EXPLANATION OF FIGURES 10 AND 11.

- Fig. A.—Maxillæ and labium seen from behind: C, cardo; L, lobe of maxilla; Lp, labial palpi; M, mentum; Mp, maxillary palpi; Pf, palpifer; S, stipes; Sm, submentum; Sp, spinneret, usually held straight.
- Fig. B.—Dorsum of larva.
- Fig. C.—Setæ of first and second thoracic segments.
- Fig. D.—Setæ of sixth abdominal segment.
- Fig. E.—Setæ of last two abdominal segments.
- Fig. F.—Venter of pupa.
- Fig. G.—Right mesothoracic leg.
- Fig. H.—Dorsum of pupa.
- Fig. I.—Head of larva from the front: Ant, antenna; Cl, clypeus; Epi, epicranium; F, front; La, labrum; Md, mandible; Oc, ocelli.
- Fig. J.—Ocelli, antennæ, etc., of larva: Ant, antennæ; La, labrum; Md, mandible; Mx, maxilla; S, indication of an antennal sclerite.
- Fig. K.—Last abdominal segment of larva seen from behind: A, central hooks; B, anal prolegs; C, anus; E, anal plate; F, movable chitinized plates.
- Fig. L.—Dorsal apodeme.

PLATE 10.

- Fig. M.—Adult in natural position, reduced.
- Fig. N.—Pupa and last larval skin in burrow.
- Fig. O.—Larva.
- Fig. P.—Tunnels in the main stem-mass.

INTERNATIONAL CONGRESS OF ENTOMOLOGY.

The following local committee for the Dominion of Canada has been formed to co-operate with the International Executive Committee in the preliminary work of arranging for the first meeting of the proposed Congress of Entomology:

Prof. C. J. S. Bethune, Editor of "THE CANADIAN ENTOMOLOGIST,"
Ontario Agricultural College, Guelph, Chairman.

Tennynson D. Jarvis, President of the Entomological Society of
Ontario, Lecturer in Entomology and Zoology, O. A. College, Guelph.

Dr. E. M. Walker, Lecturer in Biology, University of Toronto, Vice-President of the Entomological Society of Ontario, 99 St. George street, Toronto.

Prof. W. Lochhead, Biological Department, Macdonald College, Ste. Anne de Bellevue, P. Q.

Henry H. Lyman, 74 McTavish street, Montreal.

John D. Evans, Trenton, Ont.

W. Hague Harrington, Post-office Department, Ottawa.

Dr. C. Gordon Hewitt, Entomologist, Dominion Experimental Farms, Ottawa.

Arthur Gibson, Assistant Entomologist, Dominion Experimental Farms, Ottawa.

A. R. M. Boulton, President of the Quebec Branch of the Entomological Society of Ontario, Morrin College Court, Quebec.

L'Abbé V. A. Huard, Editor of "Le Naturaliste Canadien," a l'Archeveche, Quebec.

Dr. A. H. Mackay, Superintendent of Education, Halifax, Nova Scotia.

T. N. Willing, Department of Agriculture, Regina, Saskatchewan.

F. H. Wolley Dod, Millarville, Alberta.

G. W. Taylor, Dominion Biological Station, Nanaimo, British Columbia.

R. V. Harvey, University School, Victoria, British Columbia.

A meeting of the committee will be held at the Ontario Agricultural College, Guelph, on Friday afternoon, Nov. 5th.

The principal objects of the Congress are set forth in the circular which is enclosed in this number of the CANADIAN ENTOMOLOGIST.

The meeting is to be held at Brussels, from the 1st to the 6th of August, 1910, at which time the International Exposition will be open there. About a fortnight later the Eighth International Congress of Zoology will be held at Graz, in the Austrian Alps, a beautiful country little visited by ordinary tourists. The last triennial meeting was held at Boston, Mass., in 1907, and was much enjoyed by all those who were able to be present. These varied attractions will, it is hoped, induce many Entomologists from various parts of the world to be present at the first Congress in Brussels.

A NEW GENUS AND SOME NEW SPECIES OF
TENTHREDINIDÆ.

BY ALEX. D. MACGILLIVRAY, ITHACA, N. Y.

PHLEBATROPHIA, n. gen.

Antennæ with more than ten segments; front wings with the radial cross-vein, the radio medial cross-vein, and the free parts of R_4 and R_5 present; the medio-cubital cross-vein and the free part of M_{3+4} strongly divergent behind; the radial sector atrophied adjacent to the stigma; the free part of $M_4 + Cu_1$ arising near the middle of the cell M_1 ; the first and second anal cells present and separated by the free part of 2nd A; the hind wings with the vein forming the front margin of the cell R_{1+2} atrophied; the free part of R_4 and the transverse part of M_2 wanting, and therefore without middle cells; the anal cells petiolated for one-third their length; the tarsal claws cleft at apex and appendiculately toothed at base. Type *Phlebatrophia Mathesoni*, n. sp.

This genus will fall next to *Phyllotoma*, Fallen, from which it is readily separated by the atrophy of the base of the radial sector, a character which, so far as I am aware, does not occur elsewhere in the family Tenthredinidæ. If Herr Snellen van Vollenhoven's figure be correct, *Phyllotoma nemorata*, Fall., would have to be referred to this genus.

Phlebatrophia Mathesoni, n. sp.—Body black, with the inner orbits, the malar spaces, a spot above the base of each antenna, the hypoclypeal area, the clypeus, the labrum, the tegulæ, the collar and extending onto the sides below the tegulæ the legs beyond the coxæ, except the femora, which are pale at base and apex, and these areas frequently joined by a narrow band along the upper anterior margin, in some individuals expanding until it covers a half or more of the femora, and the posterior margin of the abdominal segments at sides, yellow or whitish; the antennæ with ten segments, the tenth transversely marked and an eleventh faintly indicated, the third segment distinctly longer than the fourth; the clypeus appearing six-sided, longest transversely, truncate at apex; the labrum broadly rounded at the apex; the hypoclypeal area flat, quadrangular, longer than broad; the middle fovea deep, extending from the hypoclypeal area to, and surrounding, the anterior ocellus; the antennal furrows distinct as far as the lateral ocelli; the postocular area elevated, short, three or four times, as broad as long, and bounded in front by an

irregular postocular furrow ; the posterior orbits flat and polished ; the thorax polished throughout ; the metatarsus about as long as all the other segments together ; the claws cleft, the inner ray much shorter than the outer ; the wings more or less infuscated, with a transverse fascia below the stigma ; front wings with the base of the radial section atrophied and the radio-medial cross-vein hyaline ; the saw-guides long, straight, and slightly slanting above, straight on the basal half below. gradually convexly narrowing and bluntly rounding to the apex, the upper apical angle rounded, the apex and lower margin densely fringed with setæ as long as the width of the saw-guides. Length, 5 mm.

Described from a number of females received from Mr. Robert Matheson, of Brookings, S. D., after whom the species is named, who bred the adults from larvæ received from New Glasgow, Nova Scotia. The larvæ are leaf-miners on birch.

This species appears to be very close to the European *nemorata*, Fall., and may prove later to be the same species. It agrees very well with Cameron's imperfect description of that species. My specimens all have the abdominal segments margined at sides with yellow or white, while Herr Snellen van Vollenhoven figures *nemorata* with rounded spots. He also figures the seventh segment of the antennæ as shorter than either the sixth or eighth, while the Nova Scotian specimens have all three segments subequal.

ENDELOMYIA, Ashm.

This genus was erected for *Monostegia rosæ*, Harr. The characters used by Ashmead for differentiating this genus are common to *Caliroa*, and therefore useless for this purpose. The genus is a good one, and can be separated from *Phyllotoma* and *Phlebotrophia* by having the antennæ nine-segmented, and from *Caliroa*, as generally considered, by having the clypeus truncate and the second segment of the antennæ only about half as long as the first and about as broad as long. In *Caliroa*, the first and the second segments of the antennæ are subequal in length and the second segment is therefore much longer than broad, the clypeus is always more or less emarginate.

The single species of *Endelomyia* occurring in this country is identical with the European species infesting the rose, and Harris's name of *rosæ* will have to give away to the Fabrician name of *athiops*.

CALIROA, Costa.

Konow makes the following remark in the Genera Insectorum under the genus *Eriocampoides*, Konow, regarding the genus *Caliroa*. "The name *Caliroa*, Costa, is not fit for use as a generic name because it was erected for a single male, and because the characters ascribed to it do not by far fit the genus." Konow erected his genus *Eriocampoides* in 1890. He placed in it the following species: *testaceipes*, Cam., which he now considers as a synonym of *æthiops*, Fab.; *cinxia*, Klg.; *varipes*, Klg.; *annulipes*, Klg., and *limacina*, Rétz. So far as I am aware a type has not been indicated for Konow's genus, and I would therefore indicate *limacina*, Rétz., as type. In the Genera Insectorum, Konow uses his name *Eriocampoides* for these same species, places *Caliroa*, Costa, described in 1859, as a synonym, and makes the statement quoted above. Why his name should be any more worthy, it is hard to imagine other than that it has Knw. after it.

The American species of *Caliroa*, Costa, known to me can be separated by means of the following table:

- | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 1. Clypeus roundly emarginate at middle..... | 2. |
| Clypeus broadly, angularly emarginate at middle | 14. |
| 2. Front wings with the radial cross-vein and the free part of R ₄ interstitial or very nearly so; body black, with the front and middle legs below the knees white; the walls of the pentagonal area distinct, a V-shaped furrow behind the median ocellus, line-like in width, with perpendicular walls, the lateral walls of the pentagonal area continued almost to the bases of the antennæ, somewhat S-shaped on the top of the ridge, distinctly swollen at their ventral ends and separated at middle by a deeply-impressed more or less triangular middle fovea; the antennal furrow represented on each side of the front by a large pit slightly above the ventral ends of the walls of the pentagonal area, and not connected with the antennal fovea; the hypoclypeal area triangular in outline, flat; the post-ocular area twice as wide as long, the portion of the antennal furrow on the vertex narrow, deep, and extending from the lateral ocelli to the occiput; the interocular furrow wanting; antennæ with the first and second segments together six-sevenths of the length of the third, the third segment over twice as long as the fourth, each succeeding segment slightly shorter than the preceding, except the eighth and | |

ninth, which are subequal, the ninth bluntly pointed at tip; the dorsum of the thorax polished; the scutellum finely and sparsely punctured beyond the middle; front wings with the free part of R_4 strongly bowed, the greatest length of the cell R_4 one third greater than the greatest length of the cell R_5 ; the legs finely sericeous; the posterior metatarsus shorter than all the following segments together, the second segment slightly longer than the greatest length of the third, and the third twice as long as the fourth; the abdomen inclining to reddish in some individuals, finely, sparsely setaceous; the saw-guides long and slender, straight above and below, long oblique and bluntly rounded at apex. Length, 6 mm. This is the species given by Norton as *Selandia cerasi*, Peck. Habitat: Eastern United States.....*limacina*, Retz.

- Front wings with the radial cross-vein and the free part of R_4 not interstitial, distant.....3.
3. Front with a distinct impressed V-shaped furrow behind the anterior ocellus4.
- Front uniformly flat around the anterior ocellus, without indication of a V-shaped furrow9.
4. Middle fovea triangular in outline and flat on the bottom.....5.
- Middle fovea rounded or angular in outline and angular on the bottom7.
5. Front wings with the cell R_4 twice as wide at the R_4 end as at the R_5 end; body black, with the legs beyond the apical fourth of the femora, except a more or less distinctly marked fuscous spot on the apical third of the posterior tibiæ, white; the walls of the pentagonal area distinct, the ridges fine, except on their ventral ends, where they become dilated, forming a distinct frontal crest; with a distinct V-shaped mark behind the median ocellus, its walls high and rounded above; the walls of the pentagonal area continued almost to the base of the antennæ, parenthesis-mark-like in shape on top, the enlarged ventral ends of the walls united, broken at middle by a fine shallow notch; the median fovea deep, triangular in outline, with rounded high walls on the dorsal side, united at each ventral angle with the antennal fovea, and bounded on the ventral side at middle by a small, rounded, tubercular hypoclypeal area; antennal furrow represented on each side of the front by a rounded pit, situated just above the dilated ends of the walls of the

pentagonal area ; the postocular area three times as wide as long ; the front between the eyes and the walls of the pentagonal area broadly and rather deeply hollowed out ; the portion of the antennal furrows on the vertex wedge-shaped, extending from the lateral ocelli to the occiput, the end adjacent to the lateral ocelli widest ; the interocular furrow wanting ; the antennæ with the first and second segments together two-thirds the length of the third, the third segment one and one-half times as long as the fourth, the fourth and fifth subequal, the sixth shorter than the fifth and subequal to the seventh, eighth and ninth, the ninth obliquely rounded at apex ; the dorsum of the thorax polished and finely sericeous ; the wings slightly infuscated, the veins and the stigma fuscous ; the front wings with the free part of R_4 twice as long as the free part of R_5 , the free part of R_4 and the radial cross-vein straight ; the greatest length of the cell R_4 only slightly greater than the greatest length of the cell R_5 ; the legs finely sericeous, the posterior metatarsus shorter than all the following segments together, the second segment slightly longer than the third, the third twice as long as the fourth ; the abdomen very sparsely pubescent ; the saw-guides concave above and gradually, convexly rounded below to a bluntly rounded point at apex. Length, 4 mm. Habitat : Florida. Mrs. Annie Trumbull Slosson, collector. .*liturata*, n. sp.

Front wings with the cell R_4 not twice as wide at the R_4 end as at the R_5 end, usually subequal..... 6.

6. Front wings with the free part of R_4 strongly bowed and the radial cross-vein straight ; body black, with the legs below the knees, except the apical half of the posterior tibiæ and more or less of their tarsi, white ; the walls of the pentagonal area fairly distinct, the ridges fine, enlarged at their ventral ends and forming a fairly distinct frontal crest, the ocellar basin about as broad as long, the V-shaped furrow above the median ocellus sharp and deep, a narrow, flattened area along the crest of its walls, the walls of the pentagonal area continued almost to the bases of the antennæ, slightly concave inwardly on top, the enlarged ventral ends of the walls not united at middle, broken at middle by a shallow but rather broad notch ; the median fovea deep, V-shaped, the base of the V against the frontal crest and each arm extending to an antennal fovea, the tubercular

hypoclypeal area situated between the arms of the V; a large puncture on each side of the front representing the antennal furrow, slightly above the enlarged ventral ends of the walls of the pentagonal area; the postocular area twice as wide as long; the front between the eyes and the pentagonal area broadly, deeply hollowed out; the vertical portion of the antennal furrow deep, wedge-shaped, sides parallel; the interocular furrow wanting; the antennæ with the first and second segments together three fifths the length of the third, the third segment slightly more than one and one-half times as long as the fourth, the fourth slightly longer than the fifth, the sixth, seventh and eighth successively shorter than the one before, the ninth as long as the sixth, sides parallel and bluntly rounded at apex; dorsum of the thorax polished, finely, imbricately impressed, its surface setaceous; the wings infuscated, the veins and stigma black; the front wings with the free part of R_4 slightly longer than the free part of R_5 , R_4 strongly bowed outwardly; the radial cross-vein straight; the greatest length of the cell R_4 nearly twice the greatest length of the cell R_6 ; the legs finely sericeous; the posterior metatarsus subequal in length to all the following segments together; the second and third segments of the tarsi subequal, the fourth segment about one-half the length of the third; the saw-guides strongly convex below, obliquely truncated at apex, and rather sharply rounded to a point above, the ventral margin and the apex with scattered hairs. Length, 4 mm. Habitat: Columbia, Missouri. C. R. Crosby, collector.....*lineata*, n. sp.

Front wings with the free part of R_4 straight, or approximately so, and the radial cross-vein bowed; body black, with the knees, the tibiæ, except a fuscous spot on the outer half of the tibiæ, more pronounced on the posterior, the front and middle tarsi more or less, and the hind metatarsus, white; the walls of the pentagonal area faintly indicated, obsolete on the middle of the front, their ventral ends enlarged, but not prominent, forming a frontal crest hardly raised above the ocellar basin above; the V-shaped furrow deep and rather broad, with perpendicular walls; the ocellar basin distinctly broader than long, much narrowed below, the crest of the walls of the pentagonal area strongly converging below, their walls continued almost to the antennal foveæ; the puncture on each side

of the front about opposite the enlarged ventral ends of the walls of the pentagonal area ; the frontal crest broadly and deeply broken at middle ; the median fovea distinct, V-shaped, the basal angles extended narrowly to the antennal foveæ ; the hypoclypeal area tubercular, broader than long ; the postocular area about a half wider than long ; the vertical portion of the antennal furrows narrow, shallow, linear, converging in front ; the interocular furrow distinct at its outer ends, wanting at middle ; the antennæ with the first and second segments together, three-fourths the length of the third, the third segment about twice as long as the fourth, the fourth and fifth subequal, the fifth nearly twice as long as the sixth, the sixth, seventh, eighth and ninth subequal in length, the ninth narrower than the eighth, bluntly pointed at apex ; the dorsum of the thorax polished, sparsely sericeous ; the wings slightly infuscated, the veins and stigma black ; front wings with the free part of R_4 about subequal in length with the free part of R_5 , the free part of R_4 straight and the radial cross-vein bowed, the greatest length of the cell R_4 one and one-third the length of the greatest length of the cell R_5 ; the legs finely sericeous ; the posterior metatarsus shorter than all the following segments together, the third segment one-fifth shorter than the second, and the fourth one-half the length of the third ; the saw-guides straight above, convex below, obliquely truncated at apex, and bluntly rounded to a point above, the ventral margin and the apex fringed with setæ. Length, 4 mm. Habitat : Columbia, Missouri. C. R. Crosby, collector.....*loricata*, n. sp.

7. Hypoclypeal area flat, convex, somewhat elevated adjacent to the middle fovea ; body black, with the front and middle legs below the knees, the basal half of the posterior tibiæ and metatarsus, white ; the walls of the pentagonal areas distinct, low on the middle of the front, their ventral ends strongly dilated, forming a prominent frontal crest ; the V-shaped furrow deep, with slanting walls and narrowly flattened along the crest of the ridge ; the ocellar basin longer than broad ; the crest of the walls of the pentagonal area parenthesis-like, curving laterally at their ventral ends ; the walls of the pentagonal area continued to the antennal fovea ; the puncture on each side of the front opposite the dorsal end of the middle fovea ; the frontal crest broad, deeply and narrowly broken at middle ; the median fovea distinct, more or less triangular, situated

above the antennal fovea, and its lateral angles not connecting with the antennal fovea, more or less wedge-shaped in outline; the hypoclypeal area convexly flattened, slightly elevated adjacent to the middle fovea; the postocular area about a half wider than long, strongly, convexly, elevated; the vertical portion of the antennal furrows linear, deep, parallel, the posterior orbits much lower than the postocular area; the interocular furrow faintly indicated at sides and wanting at middle; the antennæ with the first and second segments together two-thirds the length of the third, the third over one and one half times as long as the fourth, the fifth slightly shorter than the fourth, the sixth two-thirds the length of the fifth, the sixth, seventh and the eighth subequal, and the ninth shorter than the eighth, broad, bluntly rounded at apex; the thorax polished, finely setaceous and pitted; the front wings rather strongly infuscated out as far as the apex of the stigma, the remainder and the hind wings hyaline, the veins and stigma infuscated, the stigma darker on the outer half; the front wings with the free part of R_1 slightly longer than the free part of R_5 and slightly bowed inwardly; the radial cross-vein slightly bowed outwardly; the greatest length of the cell R_5 slightly more than two-thirds the greatest length of the cell R_4 ; the legs finely sericeous; the posterior metatarsus much shorter than all the following segments together, the second segment slightly longer than the third, the fourth less than one-half as long as the third; the saw-guides convex below and bluntly, obliquely rounded to a blunt point above. Length, 6 mm. Habitat: Mt. Tom, Massachusetts. A. P. Morse, collector. *lorata*, n. sp.

Hypoclypeal area strongly, convexly elevated throughout its entire length 8.

8. Postocular area distinctly broader than long; body black, with the front and middle legs below the knees, the basal half of the hind tibiæ, and their tarsi more or less, white; the walls of the pentagonal area distinct, their ventral ends strongly dilated, forming a frontal crest, broadly interrupted at middle by a deep, wedge-shaped middle fovea; the V-shaped furrow distinct, narrow, with high and straight walls; the ocellar basin much longer than broad, the crest of the walls bounding it bowed outwardly; the walls of the pentagonal area continued to the antennal fovea; the puncture on each

side of the front opposite the upper end of the middle fovea, puncture longer than broad ; the median fovea somewhat rounded in outline, deep, completely shut off from the antennal fovea ; the hypoclypeal area strongly, convexly elevated, quadrangular, longer than broad ; the postocular area a half broader than long, convex, but not strongly elevated ; the vertical portion of the antennal furrow broad, shallow, linear at bottom, the sides of the furrow slightly converging in front ; the interocular furrow faintly indicated at sides and wanting at middle ; the antennæ with the first and second segments together three-fifths the length of the third, the third segment considerably more than one and one-half times as long as the fourth, the fourth and fifth about subequal, the sixth, seventh and eighth each slightly shorter than the fifth and subequal to each other, the ninth subequal to the eighth, elongate, broadly and bluntly rounded at apex ; the thorax polished, sericeous ; the wings hyaline, the veins except the costa, and the stigma except its outer margin, infuscated ; the front wings with the free part of R_4 about twice the length of the free part of R_5 and slightly bowed inwardly ; the radial cross-vein straight ; the greatest length of the cell R_4 one-fifth greater than the greatest length of the cell R_5 ; the legs finely sericeous ; the posterior metatarsus much shorter than all the following segments together, the second and third segments of the tarsus subequal, the fourth half the length of the third ; the abdomen dull, inclining to reddish ; the saw-guides convex above and below, gradually rounded to a point at apex. Length, 4.5 mm. Habitat : Ithaca, N Y.....*lunata*, n. sp.

Postocular area about as long as broad and strongly convex ; body black, with the front and middle legs below the knees, the basal two-thirds of the hind tibiæ, and the basal three-fourths of the hind metatarsus, white or luteous ; the walls of the pentagonal area distinct ; the V-shaped furrow deep and distinctly impressed, with slanting walls ; the middle fovea deep and strongly impressed, the sides parallel, gradually sloping off above ; the antennal furrow represented by a pit on each side of the front ; the saw-guides straight above, broadly, convexly rounded below to a blunt point at apex above. Length, 4-6 mm. Habitat : Connecticut. The

above description was prepared for use in another place from a specimen named by Norton, this specimen was not available when the present paper was prepared. Ashmead made this species the type of a new genus, *Periolistoptera*, which cannot be differentiated from *Caliroa* *quercusalba*, Nort.

9. Front with the sides of the pentagonal area expanded above the bases of the antennæ into mound-like prominences 10.
Front with the sides of the pentagonal area somewhat expanded above the bases of the antennæ, but never mound-like 11.
10. Frontal crest broadly interrupted at middle, the head polished ; body black, with the front and middle legs below the knees and the basal half of the posterior tibiæ and tarsi, white ; the walls of the pentagonal area fairly distinct, expanded below into strongly-dilated mound-like areas, forming a broad frontal crest broadly interrupted at middle ; area above the frontal crest broadly flattened, becoming more or less concave between the lateral ocelli, and extending as a blunt, tongue-like, flattened projection between the lateral ocelli ; the V-shaped furrow wanting ; the median fovea represented by a roughened, more or less irregular area between and below the dilated ends of the frontal crest, the hypoclypeal area elevated at middle into a ridge of the same height and width throughout, the ridge twice as long as wide ; a large puncture on each side of the front, situated opposite the enlarged ends of the frontal crest ; the postocular area much broader than long ; the front between the eyes and the pentagonal area slightly concave ; the vertical portion of the antennal furrows fairly deep, line-like, not expanding at the surface ; the interocular furrow completely wanting ; the antennæ with indistinct segmentation, the first and second segments together five-eighths the length of the third, the third one and one-half times as long as the fourth, the fourth slightly longer than the fifth, the sixth three-fourths the length of the fifth, the seventh, eighth and ninth subequal in length and slightly shorter than the sixth, the ninth segment with straight sides and truncated at apex ; the thorax polished and finely sericeous ; the wings hyaline ; the veins, including the costa and the stigma, brownish ; the front wings with the free part of R_4 subequal in length with the free part of R_5 ; the free part of R_4 and the radial cross-vein straight ; the greatest length of

the cell R_4 only one-fifth greater than the greatest length of the cell R_5 ; the legs finely sericeous; the posterior metatarsus about subequal in length with all the following segments together, the second and third segments subequal, and the fourth segment one-third the length of the third; the abdomen black; the saw-guides retracted, uniformly convex below and appearing quite strongly narrowed to a blunt point at apex. Length, 5.5 mm. Habitat: Oswego, N. Y. C. S. Sheldon, collector.....*lobata*, n. sp.

Frontal crest very narrowly interrupted at middle, the head finely punctured; the body black, with the front and middle tibiae and the apical segment of their tarsi infuscated; the head uniformly, sparsely, shallowly punctured; the walls of the pentagonal area distinct, expanded below into strongly dilated, mound-like areas, forming a broad frontal crest narrowly and shallowly interrupted at middle; the area above the frontal crest broadly flattened, enclosed by high bounding ridges below the lateral ocelli, and extending broadly behind into the postocular area; the V-shaped area wanting; the median fovea represented by a rounded depression situated between the enlargement of the frontal crest and the elevated part of the hypoclypeal area; the hypoclypeal area broadly convex, somewhat higher adjacent to the middle fovea; the puncture on each side of the front large and situated above the enlarged ends of the frontal crest; the postocular area distinctly broader than long, depressed in front and convexly rounded behind; the front between the eyes and the walls of the pentagonal area strongly concave; the vertical portion of the antennal furrow linear and straight; the interocular furrow completely wanting; the antennae with distinct segmentation, the first and second segments together two-thirds the length of the third, the third segment one and one-half times as long as the fourth, the fourth one and two-fifth times as long as the fifth, the sixth, seventh, eighth and ninth segments subequal, and each about one-half the length of the fifth, the ninth straight on one side and gradually rounded on the other side, and at apex to a blunt point on one side; the thorax polished, sparsely punctured, sericeous; the wings slightly infuscated, the veins, including the costa and the stigma, black; the front wings with the free part of R_4 distinctly longer than the free part of R_5 , the free part of R_4

being slightly bowed inwardly and the radial cross-vein outwardly ; the greatest length of the cell R_4 one and two-thirds times the greatest length of the cell R_5 ; the legs densely, finely sericeous ; the posterior metatarsus slightly shorter than all the following segments together, the second segment twice as long as the third, and the third twice as long as the fourth ; the abdomen polished, sericeous ; the saw-guides straight above, uniformly, convexly rounded to a blunt point at apex, the apex and the ventral margin very sparsely setaceous. Length, 6 mm. Habitat : Vancouver, B. C. Received from H. L. Viereck, No. 417.....*laudata*, n. sp.

11. Hypoclypeal area elevated at middle, the elevated portion much longer than broad 12.

Hypoclypeal area elevated at middle, the elevated portion round, mound-like ; the body black, with all the legs below the knees beneath more or less whitish ; the walls of the pantagonal area fairly distinct, somewhat expanded below but not mound-like, forming a distinct frontal crest, broadly interrupted at middle ; area above the frontal crest flattened, decidedly concave in the region of the median ocellus, slightly depressed line-like behind the median ocellus ; the V-shaped furrow wanting ; the median fovea a flat V-shaped area situated below the frontal crest and connecting with the antennal fovea ; the elevated, central portion of the hypoclypeal area round and mound-like ; the large puncture on each side of the front situated just above the enlarged ends of the frontal crest ; the postocular area uniformly convex and broader than long ; the front between the eyes and the pentagonal area concave ; the vertical portion of the antennal furrow line-like, deep, wider behind, with sloping sides laterally ; the interocular furrow obsolete at middle and slightly marked at sides ; the antennæ with distinct segmentation, the first and second segments together three-fifths the length of the third, the third segment twice as long as the fourth, the fourth and fifth subequal, the sixth and seventh subequal and about half as long as the fifth, the eighth and ninth subequal and slightly shorter than the seventh, the ninth straight on each side and obliquely truncate and sharply pointed at apex above ; the thorax polished and densely sericeous ; the wings hyaline, somewhat infuscated behind the stigma, the veins, including the costa and the stigma,

brownish ; the front wings with the free part of R_4 twice as long as the free part of R_5 ; the free part of R_4 and the radial cross-vein straight ; the greatest length of the cell R_4 one and two-fifths times the greatest length of the cell R_5 ; the legs finely, densely sericeous ; the posterior metatarsus four-sevenths of the length of all the following segments together, the second segment about half as long as the metatarsus, the third segment seven-tenths of the length of the second, and the fourth about half the length of the third ; the saw-guides convex above and below, obliquely, convexly rounded to a point at apex, setæ on apex and ventral margin practically wanting. Length, 6.5 mm. Habitat, Algonquin, Ill. W. A. Nason, collector, Nos. 5804 and 5811 *lacinata*, n. sp.

12. Frontal crest not elevated above the general level of the basin above it 13.

Frontal crest strongly elevated above the general level of the basin above it ; body black, with the front and middle legs below the knees, and the basal half of the hind tibiæ and the basal two-thirds of their metatarsi, white ; the walls of the pentagonal area distinct, strongly expanded below into a pair of elevated, parenthesis-shaped ridges, forming a frontal crest extending longitudinally to the bases of the antennæ rather than transversely, and rather broadly, deeply broken at middle ; the area above the frontal crest flat, slightly lower at middle, concave around the anterior ocellus, distinctly lower than the upper margin of the frontal crest ; the V-shaped furrow wanting ; the median fovea large, enclosed between the curved lower ends of the frontal crest with furrows extending on each side to the antennal fovea ; the hypoclypeal area elevated at middle into a ridge of uniform width and height, twice as long as wide ; the puncture on each side of the front large, situated near the median dorsal end of the frontal crest, and without any indication of a transverse ridge below it ; the postocular area uniformly convex, about twice as wide as long ; the front between the eyes and the pentagonal area rather strongly concave ; the vertical portion of the antennal furrow line-like, moderately deep, with straight sides ; the interocular furrow completely wanting ; the antennæ with the first and second segments together four-fifths the length of the third, the third segment almost twice as long as the

fourth, the fourth and fifth subequal and twice as long as the sixth, the sixth and seventh subequal, the eighth and ninth subequal and slightly shorter than the seventh, the ninth with slightly tapering sides and broadly rounded at apex; the wings strongly infuscated, hyaline beyond the apex of the stigma, the veins, including the costa and the stigma, black; the front wings with the free part of R_4 one and one-half times as long as the free part of R_5 ; the free part of R_4 slightly bowed inwardly, and the radial cross-vein straight; the greatest length of the cell R_4 one and one-third times the greatest length of the cell R_5 ; the legs finely sericeous; the posterior metatarsus subequal in length to all the following segments together, the second segment one-third the length of the metatarsus, the third segment almost as long as the second, the fourth half as long as the third; the saw-guides straight above and on the basal half below, the apical half below convex and strongly, convexly rounded to a blunt point at apex, the apex and the ventral margin with a dense brush of hairs. Length, 6 mm. Habitat, Poquonock, Connecticut. H. L. Viereck, collector. Described by Norton from Massachusetts specimens.....*obsoleta*, Nort.

13. Lateral ridges of the pentagonal area not elevated at all on the front below the lateral ocelli; body black, with the legs below the knees white, the apices of the posterior tibiae and tarsi more or less infuscated; the walls of the pentagonal area distinct, but broadly rounded, broadly expanded at their ventral ends, parenthesis-shaped, the curve being turned outward, forming a frontal crest not strongly raised above the surfaces adjacent to it, deeply broken at middle; the area above the frontal crest flattened, concave, extending behind the median ocellus, between and somewhat behind the lateral ocelli; the V-shaped furrow wanting; the median fovea limited to three diverging lines, one extending between the break in the frontal crest and the others to the antennal fovea; the hypoclypeal area elevated at middle into a ridge uniformly wide and high, about a half longer than wide; the puncture on each side of the front large and situated above the dilated ends of the walls of the pentagonal area; the postocular area strongly convex, broader than long; the front between the eyes and the pentagonal area deeply concave; the vertical portion of the antennal furrow fairly

deep, linear, extending straight to the lateral ocelli, then bending abruptly outward around the ocelli and extending for a short distance beyond them; the interocular furrow completely wanting; the antennæ indistinctly segmented, the first and second segments together three-fifths the length of the third, the third segment one and one-half times as long as the fourth, the fourth one and two-fifths the length of the fifth, the sixth seven-ninths of the fifth, the sixth and seventh subequal, the eighth slightly shorter than the seventh, the ninth slightly shorter than the eighth, strongly oblique on the sides to a bluntly-rounded point at middle of apex; the thorax polished; the wings infuscated, hyaline beyond the apex of the stigma, the veins black, the costa and stigma infuscated luteous; the front wings with the free part of R_4 one and two-sevenths longer than the free part of R_5 ; the free part of R_4 bowed inwardly and the radial cross-vein straight; the greatest length of the cell R_4 one and one-fourth times the greatest length of the cell R_5 ; the legs sericeous; the posterior metatarsus subequal in length to all the following segments together, the second segment two-fifths the length of the metatarsus, the third segment five-eighths the length of the second, and the fourth one-half the length of the third; the abdomen polished black; the saw-guides retracted and impossible of description. Length, 4 mm. Habitat, Wood's Hole, Massachusetts. Described from two specimens received from Dr. Harrison G. Dyar. Bred from larvæ on *Quercus*

coccinæ *quercuscoccinea*, Dyar.

Lateral ridges of the pentagonal area strongly and distinctly elevated on the front below the lateral ocelli; the body black, including the coxæ, trochanters, and femora except the knees, the knees and the basal third of the tibiæ white, the remainder of the tibiæ and tarsi infuscated; the walls of the pentagonal area distinct, strongly elevated below the lateral ocelli, becoming almost obsolete near the middle of the front, the ventral ends dilated, the two portions standing oblique to each other with their inner and outer margins straight, forming an inverted V-shaped frontal crest strongly broken at middle, and not elevated above the area immediately above it; the area above the frontal crest perfectly flat immediately above the crest, becoming strongly concave in the region of the median

ocellus, extending behind the ocellus, and with a longitudinal furrow extending from the median ocellus for a short distance onto the postocular area; the V-shaped furrow wanting; the median fovea a dumb-bell-shaped area below the frontal crest; the hypoclypeal area elevated at middle into a ridge, uniform in width and height, twice as long as wide; the puncture on each side of the front low down, opposite the enlarged ends of the walls of the pentagonal area; the postocular area strongly convex, much broader than long; the front between the eyes and the walls of the pentagonal area hardly concave; the vertical portion of the antennal furrows shallow, linear, extending below the lateral ocelli to the ventral ends of the ridge below the same; the interocular furrow marked at sides, obsolete at middle; the antennæ with distinct segmentation, the first and second segments together three-fourths the length of the third, the third segment one and four-fifths times as long as the fourth, the fourth and fifth subequal, the sixth, seventh, eighth and ninth subequal and three-fifths the length of the fifth, the ninth straight on one side, slightly tapering on the other, bluntly rounded at apex, all the segments densely covered with moderately long hairs; the thorax polished and sericeous; the wings slightly infuscated, the veins, including the costa and the stigma, brownish; the front wings with the free part of R_4 one and fourth-sevenths times the length of the free part of R_5 ; the free part of R_4 bowed inwardly and the radial cross-vein bowed outwardly; the greatest length of the cell R_4 one and two-fifths times the greatest length of the cell R_5 ; the legs finely sericeous; the posterior metatarsus five-sixths the length of all the following segments together, the second segment two-fifths the length of the metatarsus, the third segment slightly shorter than the second, the fourth one-half the length of the third. Length 4.5 mm. Habitat: Mts. near Claremont, California. Described from a male received from Mr. C. F. Baker.....*labrata*, n. sp.

14. Hypoclypeal area elevated at middle into a prominent carina; body black, with the front and middle legs below the knees and the base of the hind tibiæ white, the remainder of the hind legs infuscated; the walls of the pentagonal area prominent, high just below the

lateral ocelli and broadly expanded at their lower ends into a V-shaped frontal crest, broadly and squarely broken at middle; the area above the frontal crest slightly concave below, deep around the median ocellus, the walls bounding it here slanting, rather abrupt and high; the V-shaped furrow wanting; the median fovea a five-sided area, narrower above, enclosed by the frontal crest and the elevated upper end of the hypoclypeal area, with a narrow furrow extending to the antennal fovea; the hypoclypeal area strongly elevated at its upper end, with a ridge at middle, uniform in width and height, and longer than wide; the puncture on each side of the front, near the middle of the front, broad and somewhat shallow; the area between the eyes and the pentagonal area almost flat; the vertical portion of the antennal furrow linear, extending to the lateral ocelli; the interocular furrow completely wanting; the antennæ with distinct segmentation, the first and second segments together two-thirds the length of the third, the third segment one and one-fifth times as long as the fourth, the fifth almost as long as the fourth, the sixth five-sixths of the fifth, the seventh, eighth and ninth subequal, slightly shorter than the sixth, the ninth much narrower than the eighth; with straight sides and bluntly rounded at apex; the thorax polished; the wings hyaline, the veins and the inner margin of the stigma brownish, the costa and the outer margin of the stigma darker; the front wings with the free part of R_4 twice as long as the free part of R_5 ; the free part of R_4 and the radial cross-vein straight; the greatest length of the cell R_4 one and four-fifths times the greatest length of the cell R_5 ; the legs finely sericeous; the posterior metatarsus slightly longer than all the following segments together, the second segment two-fifths the length of the metatarsus, the third segment subequal to the second, and the fourth one-half the length of the third; the saw-guides straight above, slightly convex below and broadly convexly rounded, somewhat truncated at apex above. Length, 4.5 mm. Habitat: Ithaca, N. Y. *lata*, n. sp.

Hypoclypeal area broadly convex, not with an elevated ridge at middle; body black, with the legs below the knees paler, strongly infuscated; the walls of the pentagonal area low and rounded, somewhat elevated in the region of the lateral ocelli, but flat on top,

their lower ends dilated, diverging like an inverted V, with straight sides, broadly rounded; the frontal crest hardly broken at middle, and somewhat elevated above the flattened area above it; the area above the frontal crest flat on its lower half, strongly concave around the median ocellus and ending in a well-marked V-shaped furrow; the median fovea a triangular depressed area, with arms extending to the antennal fovea and another through the slight break in the frontal crest; the hypoclypeal area broad, uniformly convex, its upper end strongly elevated; the puncture on each side of the front small, with straight sides, well-like, located at the median end of the ridge of each side forming the frontal crest; the postocular area uniformly convex, much broader than long; the front between the eyes and the pentagonal area concave; the vertical portion of the antennal furrows deep, linear, extending to the lateral ocelli; the interocular furrow obsolete at middle, faintly indicated at sides; the antennæ with distinct segmentation, the first and second segments together two-thirds the length of the third, the third segment one and one-third times the length of the fourth, the fifth and sixth subequal, slightly shorter than the fourth, the seventh, eighth and ninth subequal and slightly shorter than the sixth, the fourth to sixth segments broadest, gradually narrowing to the apex, the ninth segment with straight sides and truncate at apex; the thorax polished and finely sericeous; the wings hyaline, slightly infuscated below the stigma, the veins, including the cost and the stigma, brownish; the front wings with the free part of R_4 nearly twice as long as the free part of R_5 ; the free part of R_4 bowed inwardly, and the radial cross-vein straight; the greatest length of the cell R_4 slightly more than twice the greatest length of the cell R_5 ; the legs finely sericeous; the posterior metatarsus four-fifths the length of all the following segments together, the second segment one-third the length of the metatarsus, the third and fourth segments together subequal to the second; the saw-guides straight on their upper and lower margins, obliquely truncated and with a blunt point at apex above. Length, 5.5 mm. Habitat: Oswego, N. Y. C. S. Sheldon, collector. Recorded by Norton from Massachusetts and Illinois.....*fasciata*, Nort.

NOTES ON THE PREPARATORY STAGES OF PHILOMETRA
METONALIS, WALK.

BY HENRY H. LYMAN, MONTREAL.

In 1907 I spent a week, from Aug. 3rd to 10th, at Prout's Neck, Me., and found the "Common Green-head of the Seashore" (*Tabanus nigrovittatus*) very abundant and was several times bitten by the females, the males, as in all of the blood-sucking flies, including the mosquitoes, being harmless. When being driven to the railway station on the 10th in a carriage with a top, they kept swarming around and sometimes alighting on the cover, and having a number of glass-bottomed pill boxes in my pocket three specimens were secured. Later, when about to put the flies into a cyanide bottle, I noticed that in one case the glass bottom was pitted over with eggs of a honey-yellow colour, and as these had not been previously noticed I supposed that they had been laid by the fly. Not being especially interested in the Diptera and not expecting to be able to rear the larvæ I neglected to make any microscopical examination and description of the eggs.

When the eggs hatched, instead of being Dipterous maggots, they appeared to be little caterpillars, and a suspicion arose as to whether the eggs might have been laid by some moth that had been boxed and not been noticed till after the fly had been captured. Not having the least idea what the larva fed on, they were put in a tin-topped jelly jar with an assortment of "generally favourite food-plants" such as dandelion, plantain, wild cherry, etc., but as the chance of succeeding with them seemed extremely slender little attention was paid to them, and when the contents of the jar were turned out to see if the larvæ were still alive, it was found that they had eaten sparingly of the dandelion leaves and were resting upon them, although they had turned brown, wet and rotten.

Feeling compunction for neglect and fearing that they would suffer from so miserable a diet the jar was cleansed and a supply of fresh green leaves was put in and the larvæ carefully transferred to them by a camel's-hair pencil. Strange though it seemed, they did not appear to relish fresh leaves, but when they became moist and rotten the larvæ were nearly always found upon them. The amount eaten was small and growth was slow, but they were plump and about the same colour as the rotten dandelion leaves. There were not many to begin with and one by one they died off, till by hibernating time only two remained. Despairing of carrying them safely through the winter they were sent to the late Dr.

October, 1909

Fletcher, who was much interested in the matter, and sent the fly to Prof. Hine, who determined it as belonging to the species named above, but could give no information as to its early stages.

On 17th June, 1908, Dr. Fletcher wrote me as follows:

“ ‘Lyman’s mystery,’ your supposed larva of the fly from Scarboro’, Maine, has been one of the funniest things to rear that I have ever tried. One of the two specimens you sent to me last autumn was almost dead when received and did not recover. The other I got through the winter and this spring it revived about the beginning of May and ate very sparingly through May and June, I suppose not as much as one good big leaf the whole time. Its chief food was dead birch leaves after they had become damp in the tin. It also ate one good meal from dandelion and a small one from some leaves of *Aster cordifolius*, and the first day I brought it up it nibbled a little from the edge of a violet leaf, but I came to the conclusion that, like *Epizeuxis* and some other moths, its natural food-plant was dead leaves. This larva pupated on 15th, and I am most anxiously awaiting to see what will emerge.” The pupa disclosed the imago about 27th June, 1908, and it proved to be a small Deltoid moth, which was found, on my visit to Washington last spring, to be *Philometra metonalis*, Walk.

On 13th June, 1908, Dr. Fletcher made a description of the larva, with brief notes on its habits, and a few days later additional notes on the cocoon, for a copy of which to incorporate in this paper I am indebted to Mr. Arthur Gibson, his Chief Assistant:

“Length, 15 mm; width, 2.5 mm. at widest part. Head, 1.25 mm. wide, rounded, drab, mottled with purple; bilobed at apex; mouth-parts darkened. Body cylindrical, tapering a little to each end. General markings: a conspicuous dorsal stripe from segments 2 to 13, a narrow subdorsal line on a pale subdorsal field; a wide suprastigmal band bearing in its centre the third series of tubercles, in front of each of which is a dark blotch; substigmal fold pale, mottled with purple. Thoracic shield drab, with pale stripe in the middle lined on each side with black; 5 small bristles on each side, two in front, three behind, sloping forward over the head, shield bearing the end of the suprastigmal band as a dark blotch at lower end. Dorsal stripe dark olive-black, conspicuous. Suprastigmal band wide and purplish-brown, mottled. The two subdorsal series of tubercles almost in a line. Sublateral series in a straight line above and slightly anterior to spiracles, conspicuous by white shield at

base. The bristles on segments 2, 3 and 4 slope forward, on the rest of the body backward. All bristles much depressed, almost horizontal to the body. Substigmatal fold pale. Ventral surface mottled with purple. Spiracles on first three segments large and black, very conspicuous, all legs concolorous with body.

"The larva was very sluggish and fed but little on dead birch leaves and fresh dandelion leaves. The cocoon was very slight, a few strands of coarse silk fastening a leaf rolled round the larva. Change to pupa on June 16."

I have hunted up all the references accessible to me in regard to this species, but have failed to find anything recorded in reference to its preparatory stages.

Of the allied species *Philometra serraticornis*, Grote, referred by Dr. J. B. Smith as a synonym of *P. eumelusalis*, Walk., Henry Edwards records in his work on the "Described Transformations of North American Lepidoptera," apparently on the authority of French, that the larva feeds on the roots of grasses; and of *Epizeuxis æmula*, Hubn., he gives Phlox as the food-plant.

I have been unable to find in Dr. J. B. Smith's "Revision of the Deltoid Moths" any reference to the food of any of the genera being rotten or decaying vegetation, but Mr. A. F. Winn has directed my attention to a paper by the late Dr. C. V. Riley in *Insect Life*, IV, 108, on "A New Herbarium Pest," in which a new species and genus are described, *Carphoxera ptelearia*, Riley (referred in Dyar's Catalogue to the genus *Eois*, Hubner), a small geometer which preys upon dried plants. In this paper the author says that a number of genera of Deltoids are known to feed on dead leaves, mentioning *Epizeuxis æmula* as feeding on the dead leaves of hickory, *Palthis asopialis*, Guen., and *Zanclognatha minimalis*, Grote, on dead leaves of oak. I shall be thankful for any further information in regard to this matter, and especially for references to any published records of similar observations.

PACHYBRACHYS PROXIMUS.—A CORRECTION.

By some strange inadvertence I have described two species of *Pachybrachys* under the same name of *proximus* in the last number of the CANADIAN ENTOMOLOGIST, pages 313 and 320. The name *proximus* should be retained for the species described on page 313, and *confusus* applied to that on page 320.—FRED. C. BOWDITCH.

THE GEOMETRID GENUS STAMNODES, GUENEE.

BY RICHARD F. PEARSALL, BROOKLYN, N. Y.

This genus has not been heretofore accorded a place in our lists, but must now be included to cover a well-defined group of species, ranged at present under the genus *Coenocalpe*, Hubn. Long ago I became convinced of the need for their separation, and obtained, through Mr. L. B. Prout, the European type of the genus. I found it did not fit a single species, with the exception, perhaps, of *polygrammata*, Hulst. If this prove to be so, for I am not certain of it as a fact, then with it would go, I presume, the recently described species, *Coenocalpe elegans*, Gross., which he says is nearly related. I have not yet seen his type specimen. Meanwhile, a conviction, after reading his description of the genus *Stamnodes*, Guenée, and of its type *pauperaria*, Evers., forced itself upon me, that Guenée's genus must also cover certain of our species, and again I sought the kind offices of Mr. Prout for the procurement of a type specimen. It was no easy task to secure one, but it has just come to hand, a fine male from Central Asia. Its venation, style of markings, of colouring, of scaly covering, all coincide with American forms, of which the nearest would be *Seifertii*, Neum., reduced one-half. The species which easily separate under it are :

Seifertii, Neu.
topazata, Str.
fervifactaria, Grote.
splendorata, n. sp.
formosata, Str.
Franckata, Pears (MSS.).
gibbicostata, Walk.
annellata, Hulst.
coenonymphata, Hulst.
Alaskæ, Hulst.
delicata, Gross.

Of the remaining species, *aurata*, Grote ; *magnoliata*, Guen. ; *oxygramma*, Hulst, form a small composite group, which may include *parinotata*, Zeller, and possibly *Hydriomena basaliata*, Walk.

Phlebeculata, Guen., if I interpret his description correctly, does not belong here, but may be found to displace some of our *Hydriomenid* names.

Carnata, Pack., was originally described from California, and is, I believe, a good species rarely taken. I have one specimen in fair condition, which I take to be Packard's species. Forms of *polygrammata*, Hulst, frequently bear this name in collections. If I can separate it correctly, then it does not belong here, but is a near relative of some of our smaller Hydrymenidæ.

Tessellata, Pack., does not belong in *Coenocalpe*, because it is a true *Marmopteryx*, having the fore tibiæ strongly spinose at apex. When Dr. Hulst so classed this species he must have had before him a specimen similar to one I placed under that name in an article on Arizona material in Bulletin No. 1, Brooklyn Institute Museum. They are both brilliant species, and have a superficial resemblance, but ought not to be confused in future. Recently I have received from Provo, Utah, two specimens of the real *tessellata*, taken in June of this year by Mr. Tom Spalding. A description follows of the Arizona species, under the name of

Stannodes splendorata, n. sp.—Expanse, 30 mm. Palpi short, stout, creamy-brown, beneath white, tinged with deep rose-pink. Front cream-brown, a line of pure white above clypeus. Collar and vertex whitish, tinged strongly with rose-pink. Antennæ, thorax, body above, and along costa of primaries, creamy-brown or *café-au-lait* colour, the latter indistinctly checkered with dull white. Ground colour of all wings a brilliant golden-orange, intensified apically and toward outer margins. On primaries one-third in from apex a series of jet black, short strigæ, form a band, which, broad at costa, and reaching diagonally toward margin, makes a point and ceases at vein 4, where it is joined by another line of similar strigations from the extreme apex, enclosing costally an irregular rounded orange spot. A single line of like strigæ, between the veins, extends from apex to vein 4, just within margin. No marginal lines. Fringes long, pink, cut at veins with creamy-brown, rather broadly opposite veins 1 to 4, and between all veins, tipped with a patch of pure white. Secondaries without markings of any kind, except some shadowy strigations of cream-brown near apices, and with fringes paler than on primaries. Beneath, the primaries along costa and at apices are a rich creamy-brown, the former cut with four blocks of pure white. The black strigæ reproduced as above, but the enclosed rounded spot is a deep rosy pink cut with white strigæ. Extending in an outward curve from costa, one-third

in from apex, to anal angle, these markings are enclosed with a deep rosy pink, cut with short white strigæ. From base below costa to this curved line, golden-orange as above, without other markings. Secondaries deep rose-pink. Some irregular costal blotches, and the veins, are a rich creamy-brown, the whole surface irregularly strigate with black and white, the latter forming a patch at costa near apex, and a large irregular discal dot. Fringes as above, but less pink, and more heavily cut with brown and white. Body and abdomen beneath whitish, flecked with creamy-brown and deep rose-pink. Legs whitish, barred terminally with creamy-brown, and washed basally with rose-pink.

Types: Two males taken at Palmerlee, Cochise Co., Arizona, in July, by Messrs. Doll and Schæffer. One of these is in the Brooklyn Inst. Museum, the other was kindly donated to the author, and is in his collection.

Morrisata, Hulst, is a *Petrophora*, and a synonym of *volucer*, Hulst (vide Grossbeck, Trans. Am. Ent. Soc.). My paper does not definitely dispose of *all* the species listed as *Coenocalpe*, and in that respect is unsatisfactory to me, but it has required two years of effort to advance thus far, and I feel that some portion of them would better occupy a fixed position, leaving the future to determine for the rest.

THE AMERICAN DRAPETISCA.—*Drapetisca* was erected for the species *socialis*, Sund., which has remained its sole known representative. A form found in the United States has always been regarded heretofore as belonging to this European species; but a careful comparison with specimens from Europe shows it to be different. It may be designated as *Drapetisca alteranda*.

The two species may be separated clearly through structural differences, both in the epigyna of the females and in the palpi of the males. Among these differences may be mentioned that the distal portion of the epigynal plate in *alteranda* is subcordiform, whereas in *socialis* it is quadrangular, with the angles not much rounded; and that in the palpus of the first form the apophysis of the bulb is larger and decidedly more acute apically than in the European species.

R. V. CHAMBERLIN, Provo, Utah.

SYNONYMICAL AND DESCRIPTIVE NOTES ON NORTH AMERICAN HETEROPTERA.

BY EDWARD P. VAN DUZEE, BUFFALO, N. Y.

Thyreocoris pulicarius, Germar.

Dr. Distant has very kindly compared for me specimens of our northern and southern forms of this insect with the type of *Corimelena marginella*, Dallas, and assures me that that species is identical with our smaller southern form, and he agrees with me in placing this under the name *pulicarius*, Germar. Whether our larger northern form is a distinct species or merely a variation of *pulicarius* is a question on which I am still in doubt.

Brochymena Harrisii, Uhler.

An examination of Uhler's type in the Harris collection shows this to be a synonym of *annulata*, Fabr. Dr. Uhler's identification of *annulata*, published in connection with his description of *Harrisii*, really refers to *4-pustulata*, Fabr., as pointed out by me in my Annotated Catalogue of our North American Pentatomidæ. This leaves without a name the species cited by me as *Harrisii* in the paper above mentioned, which I now describe as

Brochymena punctata, n. sp.

Brochymena Harrisii, Van D., Trans. Am. Ent. Soc., XXX, p. 31, 1904.

Smaller than *annulata*, with the head more truncated at apex; pronotum, scutellum and elytra distinctly dotted with smooth white points. Length, 14-15 mm.

Apex of the head very obtusely angled, almost truncated, the inner angle of the cheeks scarcely meeting over the apex of the tylus. First antennal joint almost attaining the tip of the head, second and third respectively longer, the fourth equal to the third. Pronotum hardly as wide as in *annulata*; the humeri less produced, and the anterior lobe with coarser and more irregular denticulations; the posterior lobe quite distinctly denticulate on the latero-anterior margin; the surface closely and quite regularly punctured with fuscous on a whitish ground; anteriorly with the dark punctures segregated along the submargins and in two oval patches at the inner angles of the callosities; the median line carinate and smooth anteriorly. Scutellum shorter and more rounded at apex than in *annulata*, punctured with blackish on a pale ground, and marked with

a few scattering larger black pits, and a cluster of the same at each basal angle, intercepted by an oblique pale callous. Elytra pale, with distinct dusky punctures, which become finer and confluent in areas posteriorly on the disk; the surface sprinkled with conspicuous white calloused points, which are found more indefinitely on the scutellum and pronotum. Membrane more irregularly and obscurely veined than in the allied species. Connexivum conspicuously alternated. Legs, base of the antennæ and the rostrum ferruginous or obscure brown; the black apex of the latter attaining the base of the third ventral segment. Genital segment of the male short, of almost equal length across its whole width, the broad apical sinus subangular.

Described from one male and two female specimens received from the Georgia State collection. These were captured in Georgia, but I have seen others from Virginia. The short, square head, white points on the elytra, and imperfect white points and black pits on the pronotum and scutellum will distinguish this species.

Genus PERILLUS, Stal.

In the Genera Insectorum, Asopinæ, Schouteden has divided this genus into two, restricting the name *Perillus* to one species (*confluens*), as represented in our fauna, and establishing a new genus, *Perilloides*, for our other species—*bioculatus*, *circumcinctus*, *splendidus* and *exaptus*.

Genus PODISUS, H. S.

In the Genera Insectorum, Asopinæ, p. 68, M. Schouteden has reviewed genus *Podisus* as recognized in the Enumeratio, placing the name *Podisus* as a synonym of *Apateticus*, Dallas, and renaming the larger group of species ordinarily called *Podisus* as *Eupodisus*. Evidently he has done this on the "first species" rule, a risky rule to follow in any case, and in this instance particularly unfortunate. Stal has worked out the relations of the various species in this genus with great care, and I can see no reason why we should not follow him. Herrich-Schæffer's first species under his new genus *Podisus*, *punctipennis*, is a straight synonym of *Apateticus halys*, Dallas; his second species, *strigipes*, is an aberrant form, for which Stal has founded the genus *Mineus*, while his fifth species, *albiceptus*, is a synonym of *Tynacantha marginata*, Dallas, and must be rejected. This leaves his third and fourth species, *vittipennis* and *pallipes*, which Stal considered as typical of the genus, as he had a perfect right to

do, and consequently adopted the name *Podisus* for this, the largest section of the group, sinking his own genus *Telepta* as a synonym.

I would correct Schouteden so far as to divide this group into two distinct genera: *Apateticus*, Dallas, with *Apæcilus*, Stal, as a subgenus, and *Podisus*, H.S., with subgenus *Tylospilus*, Stal. This would leave *Telepta*, Stal, and *Eupodisus*, Schoutd., as straight synonyms of *Podisus*. I would suggest the following as the most logical arrangement of our North American species of this group:

Genus *Apateticus*, Dallas.

Subgenus *Apateticus*, Dallas.

1. *lineolatus*, H. S.

halys, Dallas.

punctipennis, H. S.

2. *marginiventris*, Stal.

Gillettei, Uhler.

Subgenus *Apæcilus*, Stal.

3. *cynicus*, Say.

grandis, Dallas.

4. *bracteatus*, Fitch.

5. *crocatus*, Uhler.

Genus *Podisus*, H. S. (Stal).

Subgenus *Podisus*, H. S. (Stal).

Telepta, Stal.

Eupodisus, Schoutd.

1. *maculiventris*, Say.

spinus, Dallas.

2. *serieiventris*, Uhler.

3. *modestus*, Dallas.

4. *placidus*, Uhler.

5. *pallens*, Stal.

6. *sagitta*, Fabr.

didymus, P. B.

monospilus, Walker.

7. *fuscescens*, Dallas.

8. *mucronatus*, Uhler.

Subgenus *Tylospilus*, Stal.

9. *acutissimus*, Stal.

Genus SCOLOPOCERUS, Uhler.

Hitherto this genus has been placed in the *Coreinæ*, near *Dasycoris*. It properly belongs to the *Centroscelinæ*, near the genera *Althos* and *Catorhintha*, between which it should be located in our lists.

Subgenus XEROCORIS, Van Duzee.

This subgenus of *Narnia* was established by me in 1906 for *Narnia Snowi* and *Wilsoni*. (Ent. News, XVI, p. 385.) *Narnia Snowi* is the type of this subgenus.

FAMILY BERYTIDÆ.

I can see no valid reason why this group should be assigned family rank. I would place it in the *Lygæidæ* as a subfamily, immediately following the subfamily *Cymina*, as has been done by Stal in the Enumeratio.

Neides muticus, Say.

This species has the coriaceous punctured elytra of *Neides*, and certainly belongs there, and not in *Jalysus*, where it is located in the Lethierry and Severin Catalogue.

Cymodema exiguum, Horvath.

I can discover no character by which to distinguish this species from *Cymus breviceps*, Stal. The two descriptions seem to refer to one and the same insect, which inhabits the Atlantic region from New Jersey to Southern Florida. I would place it in *Cymus*, although the second antennal joint is scarcely, if at all, longer than the basal. The sternal sulcation is scarcely indicated.

Belonochilus Koreshanus, Van Duzee.

Dr. Distant has compared examples of this species with the types of his *B. Mexicanus*, and pronounces them sufficiently distinct.

Perigenes fallax, Heidemann.

In the Harris collection is an example of this species under the name *Pamera constricta*, Say. This specimen, which, I understand, was determined by Say himself, wants the head, but I felt no doubt of the identification. Later I sent specimens of *fallax* to Mr. C. W. Johnson for his independent judgment, and he agrees with me in the determination. This is the species formerly determined by me as *constrictus*, Say, and it is so listed in my catalogue of the Hemiptera of Buffalo, but since the publication of Mr. Heidemann's paper I have used Say's name for an allied species, which I now describe as :

Perigenes costalis, n. sp.

Longer and narrower than *constrictus*, with the pale costal margin uninterrupted, the surface nearly smooth, not pilose as in fresh examples of that species. Length, 6-8 mm.

Head closely golden-pubescent, frequently eroded. Cheeks more prominent than in *constrictus*. Pronotum proportionately longer, the constriction nearer the posterior margin, anterior lobe less narrowed anteriorly, the posterior more coarsely punctured. Anterior femora incrassated, armed with three stout spines and a few minute teeth. Genital segment of the male oval, convex at base, beyond which is a broad lunate apical compression. Colour black; antennæ, legs, five longitudinal vittæ on the posterior lobe of the pronotum, the median a slender carina, fulvo-testaceous; apical one-half of the second antennal joint, and sometimes the third joint, a broad annulus on the anterior and posterior femora, and a narrow one on the intermediate, black; apical joint of the antennæ, tips of the tibiæ and tarsi and the rostrum piceous or almost black. Coxæ and hind edge of the pro- and metapleura more or less ochraceous. Elytra mostly blackish, with the edges, the nervures and the costa, sometimes broadly, whitish. There is usually a pale spot on the inner angle of the corium, and in pale examples the whitish areas are more or less punctured with black. Membrane fuliginous with pale nervures. Slender edges of the scutellum ferruginous.

Described from a good series representing both sexes, taken at Hamburg, N. Y., and Columbus, Ohio. On account of its more elongated form and style of marking this insect has a slight resemblance to a stout *Paromius longulus*. Some specimens are almost black, with the slender costa pale. In perfect examples the head and pronotum have a few scattering black hairs.

Genus PYGÆUS, Uhler.

Stal, in 1874, established genus *Salacia*, indicating two sections: "A" with the base of the pronotum and apex of the corium sinuated, and "B" with these margins straight or feebly arcuated. Section "A" was described as a distinct genus by Distant in 1893, and as this was the first and supposedly typical section of Stal's genus his name, *Cligenes*, must replace *Salacia*, which was preoccupied. Section "B" was described the next year by Dr. Uhler as genus *Pygæus*, with one species, *pallidus*, ranging from Canada to the West Indies. Dr. Uhler's species is evidently identical with that described one year later by Dr. Bergroth as *Cligenes*

minutus, and both may be identical with Stal's *Salacia pilosula*, although that author describes the third and fourth joints of the antennæ as of equal length. *Cligenes* has not yet been reported from north of Mexico. *Pygæus* I would retain as a distinct genus with *pilosulus* and *pallidus* as North American species.

Genus ISCHNODEMUS, Fieber.

Heretofore but little has been published on our North American species of this genus, and until very recently but one species, *falicus*, had been recorded from our territory. Descriptions of four new species from Florida and one from the Western States have been published by me during the present year, together with a doubtful recognition of one of the *Biologia* species, making a total of seven species now known from the United States. The following key may assist in placing these species :

- Rostrum not or scarcely passing the base of the prosternum 1.
- Rostrum reaching to or behind the middle of the mesosternum 3.
- 1. Antennæ ferruginous or pale at base 3. *præcultus*, Dist.
- Antennæ black or somewhat piceous in immature examples 2.
- 2. Third antennal joint scarcely shorter than the second and fourth ; discal areole of the corium with fuscous veins 1. *falicus*, Say.
- Third antennal joint distinctly shorter than the second and fourth ; discal areole of the corium immaculate 2. *rufipes*, Van D.
- 3. Osteolar orifice concolorous, blackish or very obscurely pale 4.
- Osteolar orifice large and conspicuously pale or rufo-testaceous 5.
- 4. Antennæ stout, basal joint a little longer than thick ; colour black, legs and base of the antennæ dark rufo-castaneous ; hind margin of the pronotum narrowly testaceous 4. *lobatus*, Van D.
- Antennæ slender, basal joint much longer than thick ; legs and base of the antennæ pale rufo-testaceous ; hind margin of the pronotum broadly rufo-testaceous 5. *Slossoni*, Van D.
- 5. Black ; pronotum narrowed from its base ; size large . 6. *conicus*, Van D.
- Castaneous ; pronotum posteriorly oblong, abruptly narrowed anteriorly ; size medium, form slender 7. *badius*, Van D.

1. *Ischnodemus falicus*, Say.

Say, Complete Writings, I, p. 331.

This species is widely distributed in the United States, from New York southward, but I did not take it in Florida, which is probably beyond its southern range. Its best differential characters are given in the above key, and more fully in my description of *rufipes*.

2. *Ischnodemus rufipes*, Van Duzee.

Bulletin Buffalo Society of Natural Sciences, IX, p. 167, 1909.
So far as I know this species has been taken only in Florida.

3. *Ischnodemus præcultus*, Distant?

Biologia Centrali Americana, Heteroptera, I, p. 196, 1882.

Last year I received from the late Prof. F. H. Snow two examples of a slender species which agree reasonably well with Distant's short description. These are both brachypterous, and proportionately more slender than is indicated in his figure, and the rostrum is shorter than described by him, scarcely attaining the anterior coxæ; the vertex also is black and pubescent and the size is larger. If not identical, these forms are so close I do not care to describe the present specimens as a distinct species without more material. They were taken by Prof. Snow in the Santa Rita Mts., Arizona, at an altitude of 8,000 feet.

4. *Ischnodemus lobatus*, Van Duzee.

Bulletin Buffalo Society of Natural Sciences, IX, p. 169, 1909.

This is another Florida species which I have not seen from elsewhere. It may be distinguished from the preceding by the longer rostrum and from *badius* by its black colour and the concolorous orifices.

5. *Ischnodemus Slossoni*, Van Duzee.

Entomological News, XX, p. 233, 1909.

Most nearly related to *falicus*, but with more slender antennæ, the base of which are rufo-testaceous, and the rostrum is longer. The types were taken by Mrs. Slosson at Jacksonville, Florida, and I captured one example at Raleigh, N. C.

6. *Ischnodemus conicus*, Van Duzee.

Entomological News, XX, p. 234, 1909.

This is a large species allied to *Sallei*, Sign. It was taken at Galveston, Texas, by the late Prof. Snow.

7. *Ischnodemus badius*, Van Duzee.

Bulletin Buffalo Society of Natural Sciences, IX, p. 168, 1909.

Of this rather large castaneous species I took numbers on the shore grass along Tampa Bay at St. Petersburg, Florida. I do not know of its having been taken elsewhere, but it is not unlikely that it will be found at other places along the Gulf Coast.

SOME SYNONYMS IN NORTH AMERICAN LYCOSIDÆ.

BY RALPH V. CHAMBERLIN, PROVO, UTAH.

Pardosa diffusa, Emerton (Trans. Conn. Acad. Sci., 1909, p. 208), = *Pardosa moesta*, Banks (Proc. Acad. Sci., Phil., 1892, p. 70).

Pardosa tristis, Keyserling (Verh. d. z. b. Ges. Wien, 1887, p. 485), = *Pardosa xerampelina*, Keyserling (Verh. d. z. b. Ges. Wien, 1876, p. 622).

Pardosa atromedia, Banks (Proc. Cal. Acad. Sci., 1904, p. 355), = *Pardosa lapidicina*, Emerton (Trans. Conn. Acad. Sci., 1885, p. 355). This is a common species in Southern California, where the habitat is closely similar to that of the species in the north-east. The agreement of eastern and western specimens in structure and habit is complete.

Lycosa crassipalpis, Emerton (Trans. Conn. Acad. Sci., 1909, p. 206), is clearly a *Schizocosa*. It is very close to *saltatrix*, Hentz, from which its differences are likely to prove less than specific, variation in *saltatrix* being large.

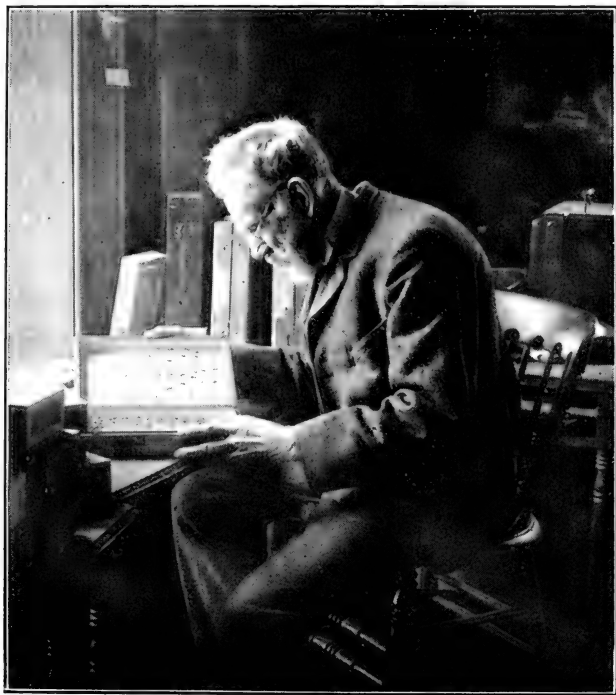
Lycosa contestata, Montgomery (Proc. Acad. Sci., Phil., 1903), = *Lycosa pratensis*, Emerton (Trans. Conn. Acad. Sci., 1885, p. 483).

Lycosa arenicola, Scudder (Psyche, 1877), is preoccupied, and hence must give way to *Lycosa Pikei*, Marx.

Lycosa pacifica, Banks (Proc. Cal. Acad. Sci., 1904, p. 354), = *Lycosa erratica*, Hentz. Examination of extensive material from Utah to California, in comparison with material from the middle west and the east, shows no good basis for the specific or varietal separation of the western specimens. Variations in some points of the characteristic colour pattern are interesting, but wholly in line with the tendencies shown in various other groups in the same regions.

Allocosa degesta, Chamberlin (CAN. ENT., 1904, p. 287), is doubtless the same as *Trochosa noctuabunda*, Montgomery (Proc. Acad. Sci., Phil., 1904). It is a typical *Allocosa*.

Lycosa exalbida, Becker, doubtfully listed in my Revision under *Allocosa*, was included in the N. A. spider fauna through an error, and should be stricken from our list. It is a South American species.



THE LATE DR. WILLIAM BRODIE.

The Canadian Entomologist.

VOL. XLI.

GUELPH, NOVEMBER, 1909.

NO. II.

DR. WILLIAM BRODIE.

We regret to have to record the death of another veteran entomologist in the person of the late Dr. William Brodie, who has recently been contributing a series of articles on galls found in the neighbourhood of Toronto. On Saturday, July 31st, on his return to his home he complained of feeling unwell, and a few days later became seriously ill. On Friday, August 6th, he expired. He was born in Peterhead, Aberdeen, Scotland, and came out to Canada with his parents when a child. His father settled on a farm in the County of York, about 30 miles from Toronto, and there hewed out of the forest a home for his family. From his earliest years Dr. Brodie exhibited an ardent love of nature in all its aspects, and became an omnivorous reader. This habit, formed in childhood, continued with him throughout his life. While fitting himself for the profession of dentistry he taught school for a time, and became one of the first graduates of the Dental College in Toronto. There he practised his profession very successfully for a long series of years. In 1903 he gave up his work and took charge of the Biological Department of the Provincial Museum.

While fully occupied during most of his time with the work of his profession, he most industriously devoted every spare moment to his much-loved study of natural history. He was a wonderful collector, and little or nothing, whether *flora* or *fauna*, came amiss to him in his rambles. He ranged over the whole domain of Natural History, and mastered in all branches information alike interesting and important; for with all his collecting there went great powers of observation and depth of insight. If he picked up a shell or a fossil, problems of antecedent conditions or of geological eras would be suggested; if he noticed a plant, some question of ecology or environment would present itself. Scientific theory on its philosophical side always delighted him. His favourite study was entomology. Galls and their inmates had a special fascination for him, and he made large collections of these and many other forms of insect life. His enthusiasm was infectious, and inspired many of his younger friends with a love for nature, and especially for the collection and observation of

insects. His work at the Museum was most congenial to him, and gave him a happy occupation when his age prohibited him from carrying on his ordinary work.

A remarkable feature about him was his mental activity ; his mind seemed always active and keenly so. Though an omnivorous reader, he was entirely free from the fault so common among great readers—that of reading mechanically ; and his power of assimilating what he read was extraordinary, as was his memory for verse ; he could recite hundreds of Scotch ballads, or the lyrics of a long succession of the greater English poets. With his friends he loved to discuss questions of general interest in science and art or the books he was reading, and many a feast of reason and flow of soul took place at his home on Parliament Street, for his doors were always open to congenial spirits. These included not only men of science and contemporaries, but many another whose outlook on life was earnest, whether the chief interest lay in letters, in art, or elsewhere. He died at the good old age of seventy-eight years, and will be very much missed, not only by the members of his family, but by a large circle of friends. Of his family of six children, three daughters alone survive. To them we extend our deepest sympathy.

A Master Mind.

[“Guide, philosopher and friend.”]

I.

Ah ! you who own the sovereign sway
Of commerce and the busy mart,
You knew him not, he lived apart,
The king who passed in state to-day.

A king who recked not worldly gear,
A pauper—you who rate by gold,
But rich in knowledge manifold,
In Nature's lore without a peer.

He lived his threescore years and ten ;
He had his court of liegemen true ;
They loved him, like that chosen few
Who served the Master scorned of men.

"He is no king of ours," you say,
"We know him not"; yet bare the head,
Pay you your tribute, he is dead,
I saw him pass in state to-day.

II.

To bow the knee he was not planned
With willowy grace and pliant form ;
Like stalwart oak he faced the storm
And bore its brunt—a monarch grand.

A shock of rebel locks upreared
Above the forehead bold and high ;
'Neath shaggy brow the deep-set eye
Challenged enquiry ; grizzled beard

Part hid the lip ; a man endured
With power of thought, you read the face ;
The Maker moulds in some for grace,
For strength those rugged features hewed.

In mind and will maturest man,
A boy at heart ; his eager quest
Of Nature's ways the boy confessed,
But through it all endurance ran ;

Bend as they might the sturdy frame
And quell the lustre of the eye,
Not years could daunt the purpose high
Or quench the ardent spirit's flame.

III.

Greybeard and youth, a thoughtful throng,
Would gather round their Scottish sage,
Right gladly youth give place to age,
Listen and learn and ponder long.

Was life's dark riddle hard to read ?
His vibrant tones would cheer. Were there
Who questioned truth ? who fought despair ?
He welcomed all, nor asked their creed.

Did they in earnest seek ? He sought
In earnest too. From bounteous store
He loved with lavish hand to pour
Jewels of knowledge and of thought.
Responsive hearts, unwavering eyes
His steadfast gaze compelled again ;
He loved the truth, his speech was plain,
He could not stoop to compromise.

IV.

Oh ! all too rare the thoughtful mind
That keeps abreast of Science' way
And still reveres the older day,
The simpler faith that lags behind.
Dead now, but while the ages run
His work shall live ; 'tis such as he
Alone inspire posterity,
Fathering their kind from son to son.
We know not when our days are sped,
And I, who through his friendship stand,
Would lift some falterer by the hand
Ere I lie nerveless with the dead.

Trinity College School, Port Hope.

FRANK MORRIS.

SYNONYMICAL NOTES ON NORTH AMERICAN HOMOPTERA.

BY EDWARD P. VAN DUZEE, BUFFALO, N. Y.

On the occasion of a recent visit to New England it was my privilege to examine three interesting collections of insects : Mr. Samuel Henshaw very kindly gave me access to the fine entomological collections of the Museum of Comparative Zoology at Cambridge ; to Mr. C. W. Johnson I am indebted for an opportunity of examining the valuable remains of the Harris collection, now housed in the museum of the Boston Society of Natural History, many of the species in which were determined for Dr. Harris by Thomas Say, and are the nearest approach to Say types now available to the student of American insects ; and, finally, on the way home I stopped over at Albany, where Dr. Felt very kindly opened up for my inspection the precious type specimens prepared by Dr. Fitch to accompany his "Catalogue of the Homopterous insects in the State

Cabinet of Natural History." While my time was all too limited, especially with the Harris collection, I made a careful examination of certain of the species, and in the present paper and in the one published in the October number of this journal I give some of the more interesting results of my studies.

At the end of this paper I add a list of the type species in the several genera of the Hemiptera thus far established by me. Many of these types have already been placed, either inferentially or directly, but all are repeated here for convenience of reference.

Anotia Bonnetii, Kirby.

In the Harris collection preserved in the museum of the Boston Society of Natural History, is an example of this insect which agrees entirely with my own determination of the species. It very closely resembles *Amalopota Fitchi*, but is paler, the elytra are more hyaline and have a different venation (see CAN. ENT., XXV, p. 280, Nov., 1893), the head is narrower before the eyes and more produced superiorly, and the antennæ are narrower and more terete. Judging from the form of the antennæ I would say that the specimen standing under this name in the Fitch collection is probably *Amalopota Fitchi*. I still think it best to retain the genus *Amalopota*, although it is scarcely more distinct from *Anotia* than is *Hynnys* from *Otiocerus*.

Lamenia vulgaris, Fitch.

An examination of the type preserved in the Fitch collection in the State Museum at Albany shows this to be the large form found on oaks throughout the Northern States. In this the male plates are very large, with their inner edges slightly parted at base, then feebly sinuated to their rounded apex, which is armed with a long inwardly curved tooth, as in the allied species. In my description of *L. Californica* (CAN. ENT., XXIII, p. 169, Aug., 1891), I applied the name *vulgaris* to another and a smaller species, which, perhaps, is not distinct from *obscura*, Ball. In most northern specimens of this smaller species there is a reëntrant angle on the inner edge of the male plates, but its depth is subject to variation, and a sufficient series might show a gradation into *obscura*, in which this angle is wanting.

Ceresa bubalus, Fabr.

Under this name in the Fitch collection is an example of *Ceresa borealis*, Fairm., as the species is determined by me in my studies in North American Membracidæ. The varieties "a" and "b" of Fitch are my *Ceresa albescens*.

Ceresa patruelis, Stal.

In the collection of the Museum of Comparative Zoology at Cambridge are examples of this species from Mexico and Florida, which convince me that this is a good species quite distinct from *testacea*, Fairm., of which the same museum has a series from Mexico and Guatemala. *Ceresa patruelis* is larger, the pronotum is higher, the supra-humeral horns are longer and more elevated, leaving the metopidium more concave transversely than in *testacea*, and the last ventral segment of the female is very short, with a broad shallow notch.

Ceresa testacea is a smaller and darker species, with the edge of the pronotal carina slenderly fuscous and the last ventral segment of the female longer and more deeply and triangularly notched almost to its base.

Thelia Godingi, VanD.

There is a specimen of this species in the Fitch collection under the name *univittata*, Harris. A specimen of the latter species in the Harris collection shows my former determination to be correct.

Telamona fagi, Fitch.

An examination of the type in the Fitch collection shows it to be but a slight variation of *cristata*, Fairm., and not identical with *scalaris*, Fairm., as supposed by me. In *fagi* the colour is more fuscous and the anterior foliole is less developed, but I cannot consider it a distinct species.

Telamona concava, Fitch.

The type in the Fitch collection agrees in every respect with the species as recognized in my studies in North American Membracidæ.

Telamona fasciata, Fitch.

An examination of the Fitch type shows this to be a male, as suggested by me in *Psyche* (V, p. 391, 1890), and the synonymy of my 1908 list must stand.

Telamona tristis, Fitch.

The type of this species in the Fitch collection is a female, as indicated by Dr. Fitch. The crest is shorter and higher than in *coryli*, and it is perhaps specifically distinct. I have recently taken a dark female of *coryli* on the hop horn-beam.

Carynota arcuata, Say.

Under this name in the Fitch collection is a specimen of an *Ophiderma*, probably *salamandra*, Fairm. I noticed the same erroneous determination in the Harris collection.

Cyrtosia fenestrata, Fitch.

The Fitch type of this species is certainly identical with the form determined by me with some doubt as *muticus*, Fabr., in my Studies in North American Membracidae, and the same determination is found in the Fitch material in the National Museum. Whether this is the true *muticus* of Fabricius is open to some doubt, although it was so determined by Dr. Uhler for the Cornell University collection, and it agrees very closely with Stal's description of the Fabrician type. For the present I would use the name *Cyrtolobus fenestratus* for this species, placing *muticus*, Fabr., as a species still unrecognized in our present collections.

Cyrtolobus vau, Say.

My determination of this species is correct by both the Harris and Fitch material.

Tettigoniella gothica, Sign.

In the Harris collection is an example of this insect labelled *Tettigonia hieroglyphica*, Say, but as this specimen was not determined by Say, it need not affect the synonymy of the species. Dr. Harris may not have known the western form to which Dr. Ball has recently restricted the name *hieroglyphica*, Say.

Pediopsis trimaculata, Fitch.

An examination of the type in the Fitch collection shows that Osborn and Ball were right in placing my *insignis* as a synonym of this species. It is poorly described by Dr. Fitch.

Idiocerus maculipennis, Fitch.

I was unable to find the type of this species in the Fitch collection. It is, however, easily recognized by the description given by Dr. Fitch. Unfortunately, this name was preoccupied by *maculipennis*, Curtis. I therefore propose the name *IDIOCERUS FITCHI* for our American species.

Deltocephalus Melscheimeri, Fitch.

A careful examination of the Fitch type verifies Prof. Osborn's determination as made in his Jassidae of New York State (20th Rept., N. Y. State Ent., p. 521, 1905). The name *affinis*, G. & B., will designate the larger species formerly determined by me as *Melscheimeri*.

Scaphoideus auronitens, Prov.

In the Harris collection I find this species labelled *Jassus areatus*, Harris. I quote this MS. name, as it has already appeared in print, and in my Catalogue I suggested it as a possible misprint for *Platymetopius acutus*, which it now seems was erroneous.

Phlepsius solidaginis, Walker.

In the Harris collection is an example of what is doubtless *Phlepsius humidus*, Van Duzee, bearing the name *Selenocephalus solidaginis*, Harris. I see no reason why we should not identify this with the insect described by Walker as *Acocephalus solidaginis*, as he quotes Harris's MS. name, and his poor description applies as well to this as to any other. Mr. C. W. Johnson has kindly compared for me specimens of both *humidus*, V. D., and *turpiculus*, Ball, with the Harris specimen, and writes that he would be inclined to consider that species as identical with *humidus*. This opinion coincides with my own, formed after a careful study of the Harris specimen, and I would sink *humidus* as a synonym of *solidaginis*, Walker.

Chlorotettix unicolor, Fitch.

The type in the Fitch collection shows my determination of this species to be correct. The name *Vanduzeei*, Baker, must be placed as a synonym of this.

TYPES OF GENERA ESTABLISHED BY THE AUTHOR.

- Brepholoxa, 1904, *type* Heidemanni, VanD.
Xerocoris, 1906, *type* Snowi, VanD.
Xestocoris, 1906, *type* nitens, VanD.
Eurocalia, 1907, *type* collaris, VanD.
Loxophora, 1908, *type* transversa, VanD.
Pelitropis, 1908, *type* rotulata, VanD.
Amalopota, 1893, *type* Uhleri, VanD.
Pissonotus, 1897, *type* marginatus, VanD.
Phyllodinus, 1897, *type* nervatus, VanD.
Laccocera, 1897, *type* vittipennis, VanD.
Macrotomella, 1907, *type* carinata, VanD.
Pentagramma, 1897, *type* vittatifrons, Uhler.
Xantholobus, 1908, *type* inflatus, VanD.
Tylocentrus, 1908, *type* reticulatus, VanD.
Idioderma, 1909, *type* virescens, VanD.
Xestocephalus, 1894, *type* pulicarius, VanD.
Neoslossonia, 1909, *type* Putnami, Osb.
Eutettix, 1892, *type* luridus, VanD.
Acinopterus, 1892, *type* acuminatus, VanD.
Chlorotettix, 1892, *type* unicolor, Fitch.
Tinobregmus, 1894, *type* vittatus, VanD.

NOTES ON *LACHNUS CARYÆ*, HARRIS, UNDER A NEW NAME.

BY H. F. WILSON, U. S. DEPT. AGR., BUREAU OF ENTOMOLOGY.

On comparing the descriptions of Harris, Monell and Riley, and specimens of this species collected from hickory, black oak, sycamore and basswood, I am of the opinion that *Lachnus longistigma*, Monell, and *Lachnus platanicola*, Riley, are synonyms of the above species, which conclusions were reached after collecting a large number of specimens, and a careful study of all forms from different host plants. I have also concluded that this so-called *Lachnus* is not a *Lachnus*, and have formed a new genus, with this species as the type of the genus.

LONGISTIGMA, n. g.

The name *Longistigma* is given on account of the extremely long, slender stigma which reaches around the end of the wing.

The honey tubes are short, conical and of fair size. The stigma and honey tubes are the distinguishing characters. Antennæ and wing-veins similar to those of the genus *Lachnus*.

Longistigma caryæ, Harris.

Synonymy: *Aphis caryæ*, Harris, Ins. Inj. Veg., 1841; id., Flint, ed., 1862; *Lachnus caryæ*, Rept. Ins. N. Y., 3: 443, 1856; Walsh, Proc. Ent. Soc. Phila., 1: 302, 1861; Thos. Rept. Ent. Ill., 8: 116, 1880; Oestl. Aph. Minn., 32, 1887; Packard, Forest Ins., 299, 323, 1890.

Lachnus longistigma, Monell, Valley Naturalist, June, 1878; Thos. Rept. Ent. Ill., 8: 119, 1880; Townsend, Ins. Life, 2: 90, 1889; Oestl. Aph. Minn., 32: 1887; Osborn, Cat. Hem. Ia., 29, 1892.

Lachnus platanicola, Riley, Am. Nat., 17: 198, 1883; Townsend, Ins. Life, 1: 197-198, 1889; Oestl. Aph. Minn., 32, 1887; Weed, Ins. Life, 3: 286-287, pl. 1, fig. 1-4, 1892.

Collected by myself, September 27, 1909, on hickory, black oak, basswood, sycamore and silver-leaf maple.

This is without doubt the largest species yet known in America, and should not be easily mistaken. Those specimens on the oak have wings darker than those on the other host plants, but this is probably due to the food. On the same host plants this species varies considerably in size and colour.

In the vicinity of Washington the eggs hatch as early as March 11th, and the egg-laying females can be found as late as Dec. 2nd.

November, 1909

Aphis caryæ, Harris, Ins. Inj. to Veg., 1841.

"The largest species known to me is found in clusters beneath the limbs of the pignut hickory (*Carya porcina*), in all stages of growth, from the first to the middle of July. It is the *Aphis caryæ* of my catalogue. Its body, in the winged state, measures one-quarter of an inch to the end of the abdomen, and above four-tenths of an inch to the tips of the upper wings, which expand rather more than seven-tenths of an inch. It has no terminal stylet, and the honey tubes are very short. Its body is covered with a bluish-white substance like the bloom of a plum, with four rows of little transverse black spots on the back; the top of the thorax and the veins of the wings are black, as are also the shanks, the feet and the antennæ, which are clothed with black hairs; the thighs are reddish brown. This species sucks the sap from the limbs and not from the leaves of the hickory."

I have used the description of Mr. C. M. Weed as given to this species under *Lachnus platanicola*, p. 286, Vol. III, Insect Life, which also helps to explain the synonymy, and is complete except the mention of the long, slender, curved stigma, which is shown in his illustrations.

DESCRIPTION.

"Apterous viviparous female: Body 6 millimeters long by 3.5 millimeters wide across middle of abdomen; antennæ 3 millimeters long; posterior legs 9 millimeters long.

"General colour light brown, with a glaucous bloom. Antennæ, eyes, most of head, two triangular spots united basally on middle of pronotum, a large quadrangular spot on middle of mesonotum, one row of small spots on each side of the dorso-meson on the segments posterior to this, another row along each side margin of all the dorsal segments, and a few smaller spots between the middle abdominal terga, together with cornicles, black; coxæ dusty; trochanters and femora, except tips, reddish-brown; tips of femora, together with tibiæ and tarsi, black, except that the middle of the tibia is often reddish-brown. Cornicles very short, conical, truncate. Ventral surface dusky, with a glaucous bloom. Rostrum dusky, reaching posterior coxæ. Body, legs and antennæ furnished with rather long, light-brown hairs. Antennæ roughened; joint iii very long, equal to iv plus v, the latter being subequal, though v is slightly longer than iv; vi short, with a well-developed thumb, forming vii; v slightly enlarged near tips by a distinct sensorium; and another on vi, at the base of the projecting thumb.

"Winged viviparous female: Body, 6 millimeters long by 3.5 millimeters wide across middle of abdomen; head to tip of folded wings, 10 millimeters; wing expanse, 18 millimeters; antennæ, 3 millimeters; posterior legs, 11 millimeters.

"Head and thorax bluish-black, with a glaucous bloom; antennæ and cornicles black; dorsum of abdomen whitish, with two rows of black spots on each side of median line, and a transverse series of small, black, indented dots on each segment. Cornicles short, conical, truncate. Ventral surface of abdomen yellowish-brown, with a glaucous bloom. Coxæ concolorous with thorax; trochanters and femora, except tips, reddish-brown; tips of femora, together with tibia and tarsi, black. Rostrum dusky, reaching posterior coxæ. Body, legs and antennæ clothed with rather long, light brown hairs. Joints of antennæ of same relative length as in apterous viviparous form. Wings clouded, especially towards base; insertions reddish-brown; veins piceous.

"Oviparous female: This form does not differ in external appearance from the apterous viviparous female.

"Winged male: Body, 5 millimeters long by 2 millimeters wide, across middle of abdomen; head to tip of folded wings, 9 millimeters; wing expanse, 16 millimeters; antennæ, 2.4 millimeters; posterior legs, 8 millimeters.

"Head and thorax bluish-black, with a glaucous bloom; antennæ piceous; eyes black. Abdomen small, dorsum whitish, but nearly covered with two rows of large black spots on each side of the dorso-meson, and having transverse rows of less distinct indented black dots. Ventral surface of abdomen yellowish-brown, with a glaucous bloom, except posterior extremity, which is black. Coxæ concolorous with thorax; trochanters and femora, except tips, reddish-brown; tips of femora, together with tibiæ and tarsi, black. Rostrum dusky, reaching slightly behind posterior coxæ. Cornicles black, conical, truncate. Body, legs and antennæ clothed with rather long, light-brown hairs. Antennæ roughened; joints of same relative length as in apterous viviparous female. Eyes as seen from above subtriangular in form. Wings clouded; insertions light yellowish-brown; veins piceous.

"Egg: Length, 1.8 millimeters; width, 0.5 millimeter. Elongate-ovoid. Orange-brown at first, but changing on exposure to shining black. Covered when first laid with a viscid substance by which it is securely attached to the bark of the twig or limb. Great numbers deposited together."

HEMIPTERA, OLD AND NEW, No. 2.

BY G. W. KIRKALDY, HONOLULU, HAWAIIAN ISLANDS.

Fam. Lygaeidae.

57. *Lygaeus Ugandicus*, nom. nov., = *Hoplopterna affinis*, Distant, 1908
(||in *Lygaeus*).
58. *Oriterus aruacanus*, nom. nov., = || *varicornis*, Westwood.

Fam. Myodochidae.

59. *Aphanus persicellus*, nom. nov., = || *Pachymerus luridus*, Jakovlev,
1878.

Fam. Nabidae.

60. *Nabis guttula*, var. ?

I possess a single female from Tunis, which is brachypterous, but differently so from the usual forms of that kind. The tegmina reach to about the middle of the third tergite, and are elongate, somewhat rounded apically, the membrane being about twice as long as usual. I cannot perceive any specific differences.

Fam. Reduviidae.

61. *Xystonyttus*, nom. nov., = *Cosmonyttus*, Stal, 1872 (not 1866), type
ichneumoneus.
62. *Myocoris*, Burmeister, = *Cosmonyttus*, Stal, 1866 (type *nigriceps*).
63. *Graptocleptes*, Stal, = *Amaurosphodrus*, Stal, 1866 (not 1872).
64. *Neotropiconyttus*, nom. nov., = *Amaurosphodrus*, Stal, 1872, type
alboannulatus.
65. *Reduvius Reuterianus*, nom. nov., = || *Reuteri*, Horváth.
66. *Rhynocoris amazulu*, nom. nov., = || *interruptus*, Stal.
67. *R. hovanus*, nom. nov., = || *nigripes*, Reuter.
68. *Dmesa choctawana*, nom. nov., = *brevipennis*, Dohrn (not Say).

Fam. Hydrometridae.

69. *Hydrometra caraiba*, Guérin. Costa Rica, Rio Machuca, 150 m.,
Pacific Coast (coll. Montandon).
70. *H. lentipes*, Champion. Costa Rica, Rio Tiribi, 1,100 m., environs
of San Jose, also on the Pacific Coast (coll. Montandon).

In both *caraiba* and *lentipes*, Champion writes that the fourth segment of the antennæ is longer than the third; this is the reverse of the case in every other species of the genus, and the specimens identified above as these two species have the usual proportions. I suppose, therefore, that an accidental transposition has been made by Champion.

71. In the ENTOMOLOGIST, 1902, p. 281, I renamed *mentor*, Champion, "*naiades*," on the ground that Champion's redescription did not agree with White's diagnosis. A specimen from Brazil, recently received, now confirms my former opinion. *H. mentor*, White, differs from *naiades* (= *mentor*, Champion) as follows: The antecular part of the head is only one-half longer than the postocular part; the labium scarcely extends to the middle of the latter part; the second segment of the antennæ is two and a half times as long as the first, the third is two and a quarter times as long as the second, and two and a seventh as long as the fourth; the pronotum has a distinct (though not distinctly margined) pale line on the pronotum, this line extending a little way onto the head.

72. *Cylindrostethus naiades*, sp. nov.

Allied to *C. persephone*, Kirkaldy, but the under side is yellowish throughout, except laterally. The upper side is blackish, with a metallic greenish gleam, tending a little to brown on the abdomen; a fulvous spot on the base of the head, a very narrow fulvous line on the pronotum; the exterolateral margin of the pleurites, on both sides, narrowly fulvous. The pale vitta on the fore femora is wedge-shaped, and is only basal.

Length, 14-15 mill.

Hab.: Malaca, Perak (my coll.).

73. *Cylindrostethus vittipes*, Stal.

Through the kindness of Prof. Aurivillius and Prof. Sjöstedt, I have been able to examine Stal's type of this species. It is not a *Cylindrostethus*, and is not an adult.

74. *Ptilomera luzonica*, sp. nov.

Apterous ♂. Fulvous; antennæ, 4th and apex of 3rd, labial segments, an elongate ovoid spot on 5th basal three-fourths of the mesonotum, the metanotum (except laterally), the 2nd-6th tergites, and down the middle of the 7th-9th, a lateral line down the fore femora (except at base), fore tibiæ and tarsi, hind and middle legs (except coxæ and trochanters), and a lateral stripe on the middle and hind ambulacra, black or blackish, sometimes verging on piceous. Under side, ambulacra, coxæ, trochanters, labium, etc., pale luteous. There is scarcely any trace of silvery pubescence laterally on the thorax, and there is no black lateral line, but the poverty of the pubescence may be due to the poor condition of the unique type. The metanotum is divided transversely, but not longitudinally. The hind part of the metanotum is transverse, and nearly

four times as wide as long, anteriorly rounded. The hind ambulacra are lateral, or sublateral, instead of dorsal, as in the typical species, and the abdomen basally is proportionately much wider. The head in profile, is also wider and fatter beneath.

This species may be separated off as a subgenus, based on the lateral aspect of the ambulacra, the non-sutured metanotum, the legs not ciliate, the hind ambulacra not spined, the fore tibiæ shorter, and the different genital segment. It may be termed *Rheumatogonus*.

Fam. Miridæ.

75. *Chlamydatus Uhlerianus*, sp. nov., = || *Agalliastes signatus*, Uhler, 1895.
76. *Calocoris pinicola*, nom. nov., = || *pinus*, Uhler, 1895.
77. *C. neotropicalis* ! = *Coranus neotropicalis*, CAN. ENT., 1909, p. 32 (laps. cal. !)
78. *Kangra ravana*, nom. nov., = || *Capsus antennatus*, W. F. Kirby.
79. *Teratocoris caricis*, nom. nov., = || *longicornis*, Uhler, 1895.

Fam. Cicadidæ.

- 79a. *Cicadetta Surinamensis*, n. n., = || *marginella*, Olivier.
- 79b. *C. calliope*, Walker, = || *parvula*, Say.
80. *C. Walkerella*, n. n., = || *connexa*, Walker.
81. *C. strepitans*, n. n., = || *obscura*, Hudson.
82. *C. minor*, Hudson, = || *cincta*, Walker.
83. *C. fusconervosa*, Stal, = || *leucoptera*, Germar.
84. *C. Fieberi*, n. n., = || *parvula*, Fieber.
85. *C. subapicalis*, Walker, = || *adusta*, Hagen.
86. *C. euphorbiæ*, Fieber, = || *dubia*, Rambur.
87. *C. decorata*, n. n., = || *picta*, Germar.
88. *Xosopsaltria capicola*, n. n., = || *annulata*, Germar.
89. *X. tabaniformis*, Walker, = || *punctata*, Thunberg.
90. *X. scurra*, Germar, = || *lutea*, Olivier.
91. *Bæturia moluccana*, n. n., = || *stigma*, Walker.
92. *B. subnotata*, Walker, = || *innotabilis*, Walker.
93. *Stagira virescens*, n. n., = || *viridula*, Walker.
94. *Mapondera capicola*, n. n., = || *pulchella*, Stal.
95. *M. hottentota*, n. n., = || *abdominalis*, Stal.
96. *Calopsaltria hottentota*, n. n., = || *elongata*, Stal.
97. *Diemeniana Tasmani*, n. n., = || *coleoptrata*, Walker.
98. *Quintilia umbrosa*, Stal, = || *diaphana*, Germar.

99. *Abricta euronotiana*, n. n., =|| *aurata*, Walker.
 100. *Tibicen pictus*, Fabricius, =|| *tomentosus*, Olivier.
 101. *Herrera ancilla*, Stal, =|| *marginella*, Walker.
 102. *Fidicina semilata*, Walker, =|| *viridis*, Olivier.
 103. *F. Cayennensis*, n. n., =|| *bicolor*, Olivier.
 104. *Ariasa quærenda*, n. n., =|| *torrida*, Walker.
 105. *A. Brasilianorum*, n. n., =|| *marginata*, Olivier.
 106. *Pomponia linearis*, Walker, =|| *fusca*, Olivier.
 107. *P. buddha*, nom. nov., =|| *adusta*, Walker.
 108. *Tettigia Australensis*, nom. nov., =|| *interrupta*, Walker.
 109. *Cicadatra concinna*, Germar, =|| *atra*, Olivier.
 110. *C. persica*, nom. nov., =|| *lineola*, Hagen.
 111. *C. geodesmia*, Kolenati, =|| *hyalina*, Fabricius.
 112. *C. anoea*, Walker, =|| *striata*, Walker.
 113. *Tosena albata*, Distant, var. *melanoptyx*, nom. nov., =|| *melanoptera*, White.
 114. *Psaltoda plaga*, Walker, =|| *argentata*, Germar.
 115. *Cicada atrovirens*, Guérin, =|| *bimaculata*, Olivier, =|| *viridis*, Fabricius.
 116. *C. hieroglyphicalis*, nom. nov., =|| *hieroglyphica*, Goding and Froggatt.
 117. *C. atrofasciata*, nom. nov., =|| *sinensis*, Distant.
 118. *C. Queenslandica*, nom. nov., =|| *graminea*, Distant.
 119. *C. azteca*, nom. nov., =|| *pallida*, Distant.
 120. *C. Brasiliensis*, nom. nov., =|| *obtusa*, Uhler.

Fam. Fulgoridæ.

121. *Nersia dioxys*, Walker, 1858, = *curviceps*, Stal, 1862.

Fam. Derbidae.

122. *Afakia*, nom. nov., =|| *Arfaka*, Distant, 1906. Into this name, presuming it to be derived from the Papuan village "Afak" (or, as it used to be called, "Offak"), Distant has written an intrusive "r," which I have omitted in the replacing name.

Fam. Issidæ.

123. *Hysteropterum Mexicanum*, nom. nov., =|| *angulare*, Fowler.

Fam. Pækillopteridæ.

124. *Pochazia antica*, Westw., =|| *fuscata*, Fabricius, = *obscura*, Melichar.

125. *P. Papuana*, nom. nov., =|| *antica*, Walker.
126. *Ricania Guineensis*, nom. nov., =|| *tenebrosa*, Walker.
127. *Nogodina oceanica*, nom. nov., =|| *hyalina*, Kirby.
128. *Mindura obscura*, Fabricius, = *fuscata*, Melichar, = *sundana*, Kirkaldy.

MORE ENNOMOS SUBSIGNARIUS.

BY WM. H. BROADWELL, NEWARK, N. J.

In the CAN. ENT., Vol. XL, 327-328, of Sept., 1908, I gave some observations on the above species, the occurrence being rather extraordinary. This year, on July 30th, they were in evidence again to nearly the same extent as last year.

I first noticed them on July 13th, when I saw about one hundred of the moths round each light; the next night and thereafter none were to be seen until the night of the 30th.

In all three instances they made their appearance about 11 p.m., and were to be seen for the rest of the evening.

Last year I captured about two dozen, of which all were males; this year I took two hundred, of which four were females. I took that number merely to find out if there were any females at all among them; so females are evidently scarce among them, or else they are good wives and stay home while they let their husbands stay out as late as they desire. At the light where I took these few, the upper part of the pole was white with them; the rope to hoist the light was even more so, there not appearing to be a place large enough for another to alight. Also on the buildings near-by it was the same. The street, paved with asphalt, was well covered with them; toads, bats, cats and several varieties of beetles in rather large numbers were on the job and having quite a banquet.

I was surprised to see them this year in such quantities after seeing them last year, as I think it is something out of the ordinary for them to be abundant for two successive years. For the ten years previous to 1908 I have never seen more than about a half dozen the whole season.

MR. EDW. M. EHRHORN, at present Deputy Horticultural Commissioner of California, with Entomological Inspector's duties, stationed in San Francisco, has received and accepted the appointment of Superintendent of Entomology of the Hawaiian Board of Agriculture, beginning October 1st. Mr. Jacob Kotinsky resumes the post of Assistant Entomologist with the Board.—JACOB KOTINSKY, Honolulu, Hawaii.

NEW NORTH AMERICAN BEES.

BY T. D. A. COCKERELL, UNIVERSITY OF COLORADO.

Melitta Willardi, n. sp. (Fossil.)

♀.—Thorax and legs apparently black; tegulæ pallid; thorax robust, 5 mm. wide; scopa of hind tibia and basitarsus abundant, coarse; no floccus at base of hind legs; hind femur about $2\frac{1}{2}$ mm. long, tibia about 3, basitarsus about 2; middle tibia short and very broad, about 1700 μ long and 850 broad at end. Anterior wings about 9 mm. long, hyaline, stigma and nervures pale brown; stigma long and narrow, but very distinct; venation normal for *Melitta* (e. g., *M. leporina*), except that the upper segment of the basal nervure is shorter; in the description here given all the measurements are in microns.

Marginal cell 2414 long, 629 deep, pointed on costa; stigma 340 deep; three submarginal cells, the *first much the longest, the second much the shortest, and receiving the first recurrent nervure at about the end of its first third*; length of first submarginal from lower basal to upper apical corner 1717, from lower basal to lower apical corner (not allowing for curve) 1530; length of second submarginal above (on marginal) 408, below (measured in a straight line from corner to corner) 493; second submarginal on first discoidal 187, on third discoidal 340; third submarginal cell on marginal 374, on third discoidal 680, its total length 952, the distance from second recurrent nervure to apical appendiculation 221; third transverse-cubital nervure with its upper part, before the strong curve, nearly straight; total length of first discoidal cell (lower basal to upper apical corner) 2805; outer side of third discoidal practically straight (as in *Andrena*, etc.); basal nervure on first submarginal cell 374, on first discoidal 1241; basal nervure meeting transverso-medial, the latter oblique, the lower end more apicad.

Hab.—Fossil in the Miocene shales of Florissant, Colorado (*Willard Rusk*, 1909). The reference of this insect to *Melitta* seems safe; the hind legs are so preserved that a floccus would be visible on the trochanters were it present; and the form of the stigma, the proportions of the submarginal cells, and the second submarginal receiving the recurrent nervure well before the middle, are all extremely characteristic. *Melitta* is a rather isolated and probably ancient genus, with few living species, all palæarctic except three, two in the north-eastern United States, and one in Lower California.

Colletes lippiarum, n. sp.

♀.—Length about $11\frac{1}{2}$ mm., anterior wing 7; black, shining, the first two abdominal segments with a strong glaucous-blue tint; pubescence white and black, nowhere at all yellowish except on legs, and here only conspicuously so on inner side of anterior tibiæ and tarsi; head broad, its copious hair white except some black on the vertex; facial foveæ narrow at apex, but rapidly broadening below; *supraclypeal area not punctured, but very finely, longitudinally striate*; clypeus prominent, very shiny, depressed in the middle, irregularly and coarsely, but not densely, striate-punctate; malar space short, more than twice as broad as long; labrum with a deep central groove and weaker lateral ones; mandibles with the apical half ferruginous, inner tooth strong; antennæ black, the flagellum after the first two joints dark reddish-brown below; middle joints of flagellum broader than long; prothoracic spines rather short but evident; hair of thorax rather dull white, black on scutellum and mixed with black on mesothorax, but dense and white in scutello-mesothoracic suture; mesothorax with strong, rather dense punctures; scutellum with large, well-separated punctures; base of metathorax with the usual plicate area, the plicæ numerous and close together, making the pits numerous and narrow, legs ordinary, the middle and hind basitarsi rather broad and flat; hind spur minutely ciliate; tegulæ dark, distinctly reddish; wings hyaline, stigma dark reddish, nervures dark sepia; second submarginal cell very broad, receiving the first recurrent nervure in the middle; abdomen very shiny, with rather narrow, but dense and very conspicuous pure white hair-bands on apices of first four segments; *no trace of a band on base of second*; first segment with very minute punctures, extremely sparse in middle, but rather close at sides; second segment with very fine punctures all over; ventral segments only moderately fringed.

Hab.—La Cueva, Organ Mts., New Mexico, prox. 5,300 feet, at flowers of *Lippia Wrightii*, Sept. 5 (*C. H. T. Townsend*). Related to *C. Texanus* and *C. scopiventer*, but readily known by the total absence of a band at base of second abdominal segment, and other characters. *C. Texanus* and *scopiventer* are spring-flying species.

Megachile megagyna, n. sp.

♀.—Length, 16 mm. or a little over, black, with the general form and appearance of *M. generosa*, Cresson, but very much larger, with conspicuous white hair in the scutello-mesothoracic suture, and yellowish-white

hair on the postscutellum ; wings dilute, fuliginous all over. Head large; eyes olive-green ; vertex broad, strong and extremely densely punctured, but at sides, behind summits of eyes, sparsely punctured ; lateral ocelli considerably nearer to eyes than to hind margin of head ; antennæ black ; clypeus densely punctured, rather more sparsely in the middle, the punctures throughout conspicuously of different sizes ; clypeal margin with a small median tubercle, and a slight dentiform angle some distance on each side of it ; mandibles broad, obtusely quadridentate ; maxillary palpi small ; first joint of labial palpi about as long as second ; hair of head and thorax white, with more or less of a yellowish tinge ; vertex with extremely scanty short dark hair ; mesothorax denuded, dull and densely punctured, with remnants of a pair of anterior lines of white hair, in the manner of allied species ; tegulæ very dark reddish-brown ; legs with light hair, that on inner side of tarsi pale orange ; claws with basal tooth poorly developed ; middle tarsi broad and flat, densely covered with pale yellowish hair on outer side ; hind basitarsus very broad and flat ; abdomen broad, with narrow but conspicuous yellowish-white hair-bands ; surface between the bands with very short black hair ; when the abdomen is seen from above the black hair projects at sides, but is very short ; sixth segment convex, with no differentiated lip, its base with dark hairs like those of the other segments, its apical half with appressed yellowish hair ; last ventral segment projecting a little beyond last dorsal ; ventral scopa creamy-white, black on last segment.

Hab.—Lee County, Texas, June, 1908 (*Birkmann*). Nearest, I think, to *M. Newelli*, Ckll., but much larger, with the vertex much broader, and the punctures of mesothorax much larger and not so dense. It is easily known from *M. generosa*, Cress., by the larger size and the extreme brevity of the black hair on the abdomen. The dark wings readily separate it from *M. sexdentata*, Rob.

GEOMETRID NOTES—*EUPITHECIA MISERULATA*, GROTE.

BY L. W. SWETT, BOSTON, MASS.

In "Entomological News" (Vol. XIX, July, 1908, page 312), Mr. R. F. Pearsall gives us an excellent article on *Eupithecia miserulata*, and has without doubt established its identity correctly. This summer I have been gathering material from all parts to find out more about this troublesome species, with a fair degree of success. It evidently has more than

two broods, as in a series of 100 specimens before me I have three specimens dating May 22-27, a number July 10-22, more from Aug. 1 to 20, and a few from Sept. 1-5. Separating them into groups, according to months, I find great variation in size, and ochre colouring in the extradiscal line; the specimens range from 13 mm. to 20 mm. The ochreous colouring does not seem to be confined to those of any one month, but the September specimens perhaps are a trifle more highly coloured. It was from two small-sized males that I drew up my description of *E. Grossbeckiata*, *nebulosa* and *miserulata*, males not being known at that time. Mr. Chas. R. Eby, of Washington, D. C., has kindly furnished me with a large series collected at East River, Conn., and has bred the species on Joe Pye Weed, which is, I believe, a new food-plant for it. Mr. Dimmock, of Springfield, Mass., gave me specimens which he had bred on Aster, and Mr. Pearsall in his article mentions that Patton reared *miserulata* on Composite flowers. Packard in his Monograph, page 55, gives the food-plant as juniper, but I believe he bred only the true *interruptofasciata* on this, as he evidently did not know *miserulata*, Grote, which, I believe, has not so far been found on the juniper. In the collection at Albany, N. Y., are two of Packard's male types of *Eupithecia interruptofasciata* (in error), on which I wrote an article in the CAN. ENT. (Vol. XI., No. 7, page 246). One of the specimens, No. 1833, with heavily-ciliated antennæ, is the male of *Eupithecia miserulata*, Grote; the other male, No. 1833a, is *Eupithecia conformata*, Pearsall, recently described. This does not affect the standing of *interruptofasciata*, as I retained the name on the female specimens in the Packard collection at Cambridge, but it clears up the identity of the males at Albany, N. Y.

Thus the species *miserulata* stands:

- Eupithecia miserulata*, Grote (Proc. Ent. Soc. Philadelphia, II, 32, 1863).
- = Syn. *nebulosa*, Hulst (Trans. Am. Ent. Soc., XXIII, 266, 1896).
- = Syn. *Grossbeckiata*, Swett (CAN. ENT., XXXIX, p. 378, 1907).

Eupithecia miserulata, Grote, probably is labelled correctly in very few collections, but is easily distinguished by the heavily-ciliated antennæ. Plate VIII, fig. 5, in Packard's Monograph is a very good figure of the ochreous form which seems to come later in the season. The species seems to be far more common in the South Atlantic States, but is comparatively local in Massachusetts, though common in Connecticut and southward.

NOTES ON TENTHREDINOIDEA, WITH DESCRIPTIONS OF NEW SPECIES.

BY S. A. ROHWER, BOULDER, COLO.

PAPER VII. — NEW BLENNOCAMPINÆ.

Claremontia, n. gen.

Malar space linear; clypeus truncate; antennæ long and slender, almost as long as the body, the third and fourth joints equal in length; venation very much like *Blennocampa alternipes* (fig. 72, pl. XXXVI, Proc. U. S. Nat. Mus., XXIX), the third cubital cell is shorter on the radius than the second; the transverse radius and the third transverse cubitus running in about the same direction; hind wings without a discal cell; the lanceolate cell of the hind wings longly petiolate, the radial cell rounded at the apex and without an appendiculation; there is no surrounding nervure in the hind wings; the tarsal claws with an inner tooth; the hind basitarsus shorter than the remaining joints.

This genus is nearest to *Blennocampa* in venation, but it differs from that genus in the long antennæ. The long antennæ are suggestive of *Phymatoceros*, but that genus has the third cubital cell longer and the tarsal claws are cleft. Type, *Claremontia typica*, Roh.

Claremontia typica, n. sp.—Female: Length, 6 mm. Anterior margin of the clypeus truncate; middle fovea and the ocellar basin wanting; the ocellar furrows reduced to foveæ, which are confined to the ocellar region; scape globose, the antennæ clothed with short black pile; the entire insect shining and nowhere densely sculptured. Stigma rounded on the lower margin, broadest in the middle; the transverse radius interstitial with the third transverse cubitus. The sheath is parallel-sided, the apex obliquely truncate. Colour black; legs below the femora brownish, paler at the base of the tibiae. Wings dusky hyaline, strongly iridescent; venation black.

Male: Length, 5 mm. The male agrees in general with the female, but the legs below the femora are, as a rule, paler. The antennæ are as long as the body; the hypopygidium is very obtusely rounded at the apex.

Type locality: Mountains near Claremont, California. Four males and two females collected by C. F. Baker.

Periclista leucostoma, n. sp.—Female: Length, 5 mm. Anterior margin of the clypeus semicircularly emarginate, the lobes broad and rounded; the ocelli in a low triangle; the ocellar basin wanting, the furrows around the ocelli distinct; the front finely punctured; the antennæ normal, the third joint distinctly longer than the fourth, which is equal in

length to the fifth; dorsulum and the scutellum sculptured like the head; the inner tooth of the tarsal claws large; the stigma is rounded on the lower margin, broader at the base; the third cubital cell receives the transverse radius near the apex. Colour black; the head and thorax with a distinct greenish tinge; clypeus, labrum, mandibles, angles of the pronotum, tegulae, apex of the abdominal segments (very narrowly above, but broadly on the sides and beneath) *yellowish-white*. Legs yellowish; a line on the coxae, trochanters, femora and posterior tibiae above black; tarsi blackish. Wings hyaline, iridescent; venation brown, the stigma a trifle paler.

Male: Length, 4.5 mm. The male is like the female in all ways, except the reduced amount of black on the abdomen. The hypopygidium is large and rounded at the apex. The wings are a trifle dusky, and there is no surrounding nervure in the hind wings.

Type locality: Claremont, Calif. Two females and five males, collected by C. F. Baker; also a female collected in the mountains near Claremont.

This species has its nearest ally in *emarginata*, MacG., (Boston, Mass.), but the femora are black above, and the male has the abdomen black above.

Periclista occidentalis, n. sp.—Female: Length, 5 to 5.5 mm. Anterior margin of the clypeus truncate; the ocellar basin not well defined; the furrows all present, and some of them narrow and distinct; ocelli in a low triangle, the anterior ocellus the largest; the antennae rather short, the third joint longer than the fourth, the fourth and fifth equal; the mesonotum shining, with a few scattered punctures; the scutellar appendage is smooth, shining; the tarsal claws with a large inner tooth; stigma broader at the base; the transverse radius received in the apical third of the cell. Colour black; anterior margin of the clypeus, the labrum, a spot on the mandibles, pronotum, tegulae, the sutures of the mesonotum, the upper half of the pleurae, sides of the abdomen and narrow margins of the segments above and beneath, *white* or *yellowish-white*. Legs yellowish or pallid, the femora darker and the tarsi somewhat infuscated. Wings hyaline, iridescent; veins pale brown, the costa and stigma paler. Sheath broad, obliquely truncate.

Var. A: The transverse radius is near the middle of the third cubital cell, and the stigma is narrower in a female collected in the mountains near Claremont.

Male: Length about 4 mm. The male is much like the female, differing in having the markings orange-colour, and more reduced. There

is no yellow on the mesonotum, the legs have a black line above on the femora and tibiæ. The venation is darker and the stigma is dark brown; there is no surrounding nervure in the hind wings.

Type locality: Claremont, California. Three females and three males collected by C. F. Baker.

The following table will separate the female from its allies:

Orbits pale (Texas).....	<i>mutabilis</i> , Knw.
Orbits black.....	1.
1. Coxæ black (legs reddish).....	<i>purpuridorsum</i> , Dyar.
Coxæ pale.....	2.
2. Abdomen beyond the second segment pale; the transverse radius in the middle of the third cubital.....	<i>marginicollis</i> , Nort.
Abdomen above black; the transverse radius in the apical third of the third cubital cell.....	<i>occidentalis</i> , Roh.

Aphanius lenis, n. sp.—Female: Length, 5 mm. In the middle the clypeus is convex, the anterior margin is truncate; labrum triangular, the apex obtuse. Supraclypeal fovea deep; the middle fovea large, open below, the lateral walls very strong; the walls of the ocellar basin rounded; the lateral ocellar furrows interrupted on the front; at the top of each lateral ridge of the middle fovea is a deep oval pit; head shining, polished. The scutellum with a few rather small punctures; the scutellar appendages smooth; tarsal claws deeply cleft, the inner tooth a little the shorter; the stigma angled beneath, tapering to an acute apex; transverse radius curved and joining the radius a little before the apex of the third cubital cell; the third cubital cell much broader below, due to the bent third transverse cubitus; the second recurrent nervure received near the base of the third cubital cell. Sheath straight above, rounded below. Black; pronotum, tegulæ, a longitudinal oval spot on the abdomen above and beneath at the base luteous. Legs black; the four anterior knees, all the tibiæ and the tarsi whitish; the tarsi are more or less infuscated. Wings hyaline, slightly dusky, iridescent; veins and stigma black.

Male: Length, 4 mm. The male differs from the female in having the pronotum largely pale, the pale of the legs more luteous, the posterior tibiæ brown (not whitish), and the luteous spot of the abdomen is larger. The hypopygidium is rounded at the apex.

Type locality: Mountains near Claremont, California. One female and two males collected by C. F. Baker.

A very distinct species, easily recognized by the oval luteous spot on the abdomen. The marking of the abdomen is much the same as in *Lycoata lenis*, Cress., and *Epitaxonus multicolor*, Nort., male.

THE LARVA OF *NEOARCTIA BEANII*, NEUM.

BY ARTHUR GIBSON, OTTAWA.

On May 19th, 1908, the late Dr. Fletcher, received from Mr. N. B. Sanson, of Banff, Alta., two arctian larvæ, which had been found on Sulphur Mountain. These larvæ were given to the writer. Both specimens moulted on May 22nd, but one died immediately afterwards. The plant *Antennaria racemosa* was sent with them. *Antennaria rosea*, some plants of which (from British Columbia) were growing on the Experimental Farm, was offered to the larvæ, as well as plantain, willow, grass and dandelion. The only food which the remaining larva would eat was plantain. This it ate readily. On May 28th the following description was taken:

Mature larva.—Length, 32 mm. Head, 2 mm. wide; somewhat quadrate, only slightly depressed at vertex, jet black, shining; hairs on face black. Dorsum and sides of body, above spiracles, dull green, densely mottled with brown; skin on lower portion of sides, enclosing tubercles iv, v and vi, almost wholly orange; venter greenish. An indistinct, dull orange, dorsal stripe is present. Tubercles all black and shining, bristles very faintly barbed. Tubercle i as large as ii, iii and iv, which are all about the same size. Bristles from tubercles i and ii all black, from iii black, with a few white ones intermingled. From lower half of iv, and from v and vi, the bristles are bright rust-red; from vii and viii dark rust-red, spiracles black. Thoracic feet black, shining; plates on prolegs dark shiny brown.

The larva did not feed on May 28th, and before evening it had spun a few threads of silk. By the morning of the 30th it had changed to the pupa. The cocoon was simply a very thin covering of whitish silk. The moth emerged on June 15th.

Pupa.—Length, 21 mm.; width at widest part, 5.5 mm. Colour dark bluish-black; very faintly pruinose; shining, particularly at folds of abdominal segments. Abdomen bears sparsely, very short, thick, reddish hairs. Spiracles black. Cremaster round, dark reddish-brown, shining, terminating in a bunch of about 18–20 reddish bristles of varying lengths, each with a distinct tendril-like curve at the tip.

In the CANADIAN ENTOMOLOGIST, June, 1891, p. 124, a short description of the larva is given by Mr. Bean. Since this note appeared, Mr. Bean tells us that he found a further larva in the middle of July, 1893, at about 7,000 feet altitude, on Mount St. Piran. This larva produced a male moth on Aug. 20th.

EUROPEAN HETEROPTERA SUPPOSED TO OCCUR IN AMERICA.

BY J. R. DE LA TORRE BUENO, NEW YORK.

The eminent Hemipterist, Dr. G. Horváth, gave in 1908 a list of the Hemiptera common to the Old and the New Worlds,¹ which I reviewed in the same year,² calling attention to one or two points at variance with later unpublished observations. Subsequently, Dr. Horváth having studied the material he had obtained in this country in 1907, made known his results late in 1908, under the title, "Remarques sur quelques Hémiptères de l'Amerique du Nord."³ His critical comparison of those of our native forms hitherto considered the same as the European, clearly revealed the burden of misidentification under which American Hemipterists of this generation had laboured, and from which some appear not to have escaped as yet. A review of this paper appeared in the CANADIAN ENTOMOLOGIST,⁴ in which were noted the full synonymies for the new species created out of what we had complacently regarded as common to both continents. By an oversight, the new species, *Chlorochroa persimilis*, Horv., described from what we had known as *Pentatoma juniperina*, L., was omitted from the list of new species on p. 294 of this review.

And yet, although Horváth's papers appeared in 1908, and were received in this country early in 1909, in the current number of the Journal of the New York Entomological Society,⁵ the minutes of the meeting of March 2 give a list of nine species of Palæarctic Heteroptera exhibited, which were declared to occur also in the United States. Unfortunately four of these are but a repetition of the old errors, the species being *Pentatoma juniperina*, *Cymus claviculus*, *Ischnorhynchus resedæ*, and *Emblethis griseus*.

Possession of a specimen of the true *P. juniperina*, L., for the last four years, and comparison with what purported to be that species from America, gave rise to great misgivings as to ours being the same species as the European form, and long before Horváth's publication Van Duzee had recognized the two as distinct. As to *Emblethis griseus*, a mere glance at this in comparison with our *E. vicarius*, Horv., would settle any doubts as to their non-identity. Similarly, our *Ischnorhynchus geminatus*

1. Ann. Mus. Hist. Nat. Hung., VI, pp. 1-14.

2. CAN. ENT., XL, pp. 300-302.

3. Ann. Mus. Hist. Nat. Hung., VI, pp. 555-69.

4. Aug., 1909, Vol. XLI, pp. 294-6.

5. Vol. XVII, No. 3, p. 138.

of Say is readily distinguishable from *E. resedæ*, Panz. I have not compared the *Cymus*. Dr. Horváth in the second paper cited sets forth the distinguishing characteristics of the new species, and they need not be cited here.

As to the others, *Nezara vividula* is practically of world-wide distribution, and is said to occur in Florida, but I have never seen it from that section; *Zicrona coerulea* is credited to the Western States, but I have not yet succeeded in getting an example from this country; *Corizus crassicornis* and *Nysius thymi* also occur in this part of the country, but nothing short of an abundance of good material and a critical investigation could fix the fact beyond doubt.

I sincerely hope that the day is now at hand when American Entomologists will break the enslaving shackles of tradition and emerge from the frame of mind so akin to ancestor worship that seems to still obsess them. While we should respect the work of our predecessors, the pioneers in a sterile field, I fail to see the necessity of following in their footsteps, stepping cautiously into each footprint, like Indians on the warpath. It is really distressing, when expecting new light on an old subject, to meet with nothing but a repetition of the old errors which make the clear waters of science as murky as the ocean from the cuttle's ink.

TWO NEW SPECIES OF SAW-FLIES.

BY ALEX. D. MACGILLIVRAY, ITHACA, N. Y.

The two following descriptions are offered at this time in order that the species may be properly recorded in the new list of New Jersey insect in course of preparation :

Pæcilostoma convexa, n. sp.—Body black, with the labrum, the clypeus, the angles of the pronotum, the tegulæ, the trochanters in part, the femora above more or less, and at apex, the front and middle tibiæ, more or less infuscated on the apical half, the tarsi at base, and an ovate spot on each side of each abdominal segment, white or brownish-white; the antennal fovea large, angled above; the antennal furrows entering the angle in the antennal fovea, punctiform adjacent to the antennæ, somewhat obsolete or broadly indicated on the front, becoming a fine line-like furrow opposite the lateral ocelli, becoming broader on the vertex and extending to the occiput; the median fovea small, well-like; situated

between and above the antennæ ; the pentagonal area elevated, with broad rounding walls ; the ocellar basin convex, with a short longitudinal furrow in front of and behind the median ocellus, the posterior furrow joining the interocellar furrow ; the interocellar furrow straight, extending between the lateral ocelli, but not joining the antennal furrows at side ; the body uniformly, densely covered with short white setæ ; the clypeus emarginate at apex, but not carinate at middle ; the antennæ with the third segment longer than the fourth and shorter than the fourth and fifth together, the fourth longer than the fifth, the sixth to ninth subequal, the ninth bluntly rounded at apex ; the wings hyaline; the veins, stigma and the costa black ; the stigma twice as long as broad, convex behind ; the saw-guides straight above, straight and converging below, obliquely truncate at apex, the lower angle broadly rounded, the upper more pointed, the margin fringed with setæ. Length, 7 mm.

Habitat.—New Brunswick, New Jersey. Received from Dr. J. B. Smith.

Schizocerus Johnsoni, Ashm., MSS.—Body black, with the pronotum, the tegulæ, the base of the wings, the lateral lobes of the mesonotum and the lateral margin of the median lobe adjacent to them, the knees, the front and middle tibiæ and the basal half of their tarsi, the basal half of the hind tibiæ, and a broad band along the lateral margin of the abdomen, the side of the band straight on the ventral side, angulate in front on each segment on the dorsal side ; the head, thorax, and abdomen polished ; the clypeal fovea deep and continuous with the antennal fovea, the antennal furrow a deep channel extending from the antennal fovea to the lateral ocelli, where the ridge shelves off and the furrow becomes broadly linear around the lateral ocellus and indistinct opposite the postocular area ; the postocular area distinct, strongly elevated ; the interocellar furrow sharply impressed, distinct, concave behind, continuous ; the pentagonal area sharply outlined by the inner walls of the antennal furrows, triangular in outline, long and narrow ; the median fovea a deep pit in the tip of the pentagonal area, round ; the ocellar basin distinct, sharply depressed, ring-like around the median ocellus, the depression connected with the interocellar furrow ; the hypoclypeal area produced into a high, thin ridge between the antennæ, broadly, convexly expanded below ; the posterior orbits flat ; the saw-guides straight above and below, slightly concave near the middle of the ventral surface, convexly, obliquely

truncated at apex, the angles broadly rounded, the lower angle most protuberant. Length, 7 mm.

Habitat.—Riverton and Avalon, New Jersey.

This species will fall near *plumiger*, Klg. It differs from a male from Florida, which I take to be this species, in lacking the circular depressed ring around the median ocellus, and in lacking the interocellar furrow. A female from Colorado has the circular depression around the median ocellus indicated, but the interocellar furrow is wanting. Both of the above specimens are differently coloured from the species here described.

Described from two specimens received from the Wagner Free Institute of Science of Philadelphia, and a female from the U. S. National Museum bearing Mr. Ashmead's label. Unfortunately, Mr. Ashmead had never published a description of this species. The specimens were all collected by Mr. C. W. Johnson, to whom Mr. Ashmead had dedicated the species.

Melanoselandria Zabriskiei, Ashm., MSS.—This species is recorded by Ashmead in the New Jersey List from the Delaware Water Gap, VII, 5, and as collected by Mr. C. W. Johnson. I have before me a single specimen from the U. S. National Museum, bearing Ashmead's label, collected by J. L. Zabriskiei at Flatbush, N. Y., 12, VI, 1897. Mr. Ashmead's name, both generic and specific, is undescribed. The only record of the name that I can find is the one given in the New Jersey List, p. 606. An examination of the National Museum specimen proves it to be Norton's *Selandria fumipennis*. I made this species the type of a new genus, *Hypargyricus*, the description was published in the CANADIAN ENTOMOLOGIST for August, 1908, p. 290. This specimen has the rudiment of the third anal vein especially distinct, it was evidently this that misled Mr. Ashmead, causing him to place it in the subfamily Hoplocampinae, from all the members of which it is strikingly different.

COLEOPTERA OF INDIANA.—Prof. W. S. Blatchley, of Indianapolis, Indiana, has almost ready for the press a descriptive catalogue of the Coleoptera known to occur in Indiana. It will be along the same lines as his "Orthoptera of Indiana," published in 1903, and will be issued as one of the reports of the Indiana Department of Geology and Natural History. Any person outside of the State having examples of rare or interesting species *known to have been taken in Indiana* will confer a favour by sending him data regarding them.

THE FAMILY NAME LYGÆIDÆ.

BY E. BERGROTH, FITCHBURG, MASS.

Mr. Kirkaldy has shown that *Lygæidæ* cannot be used as a name for the family that has hitherto borne this name, the type of the genus *Lygæus* being a Coreid. He has also, without ostensible reasons, transferred the name *Lygæidæ* upon the family Coreidæ, a procedure which has already brought on considerable confusion, and which must be dismissed as entirely unwarranted. The genera *Coreus*, Fabr., and *Lygæus*, Fabr., were described for the first time in the same work (1794). Moreover, the description of *Coreus* is printed some pages ahead of *Lygæus*. There is thus absolutely no reason to follow Kirkaldy in this point. The same is true of several generic alterations and transpositions introduced by Kirkaldy and too rashly accepted by some contemporary hemipterists.

BOOK NOTICES.

A MONOGRAPHIC REVISION OF THE COLEOPTERA BELONGING TO THE TENEBRIONID TRIBE ELEODIINI inhabiting the United States, Lower California and adjacent Islands. By Frank E. Blaisdell, Sr., United States National Museum, Bulletin 63, Washington, 1909.

The above monograph by Dr. Blaisdell furnishes us a striking example of the application of thorough methods of entomological study. Discarding the superficial criteria employed by most of his predecessors in discussing this difficult group, he has made exhaustive anatomical investigations of the exoskeleton, and especially of the genital organs, basing his subgeneric classification particularly upon these latter structures. In *Eleodes*, however, the female characters are those upon which special stress is laid, while in general, not only in this country, but in the numerous European papers in which the genitalia are employed in classification, the male has served as the chief guide. The supplementary table, based upon features which may be seen without dissection, will doubtless be more readily followed by the great mass of students. The importance of the sexual organs in defining species (as understood by Dr. Blaisdell) is easily appreciated when we read on page 32 that "each species may have its extreme large (gigantism) and small (nanism) forms; its smooth and rough forms, elongate and robust forms, while the sculpturing varies from comparatively smooth to rough, independently of size or form. This may be accounted for by environment to a great extent and to certain

inherent factors." Our own field experience gained among the numerous mountain ranges and intervening valleys of the Western States leads us to fully agree with this belief in specific variation. Others may view all these visible expressions of the influence of surroundings upon the organism as "species," but in this case the analysis of each type by Dr. Blaisdell is so close that the process of further "specific" division resolves itself into a matter of changing the relative rank of his names. Where necessary, the species are divided into named "varieties," to which the author frequently alludes as "races," but which might as properly be called subspecies; these varieties are often subdivided into "formæ," or "incipient races," to which descriptive Latin names are given "as an aid in recording data and as a compromise between unscientific lumping and splitting."

The monograph proper occupies 524 octavo pages, and is illustrated by 13 plates, eight of which deal with genitalia, one with general anatomical structures, three with outlines of pronota and one with the early stages. The table of contents enumerates 73 recognized species and 31 varieties of *Eleodes*, besides three specific names representing types unknown to the author. In *Trogloderus* we find two species, in *Embaphion* seven, with one variety. The genus *Eleodimorpha*, founded on *E. bolcan*, n. sp., is described as new, as are also a number of species and varieties belonging to the other genera. Unfortunately, neither the table of contents nor the index give any clue as to which of the included names are new, and recourse to the text is necessary to discover the author. This trouble might have been obviated by the inclusion of a complete bibliographic and synonymical list enumerating all the species, varieties and formæ, which would serve not only to indicate the novelities, but also as a convenient guide to cabinet arrangement.

A special feature of the work is the fullness of specific and varietal descriptions. The genealogical diagrams given for each subgenus are interesting. In the arrangement, a few inconsistencies have attracted our attention, for instance, in the table of contents *Eleodes arata* is given as a specific term, while in the text, page 187, it is cited as a synonym of *obscura*, and on page 194 is described as a "forma" of variety *sulcipennis*. Again, *E. tenuipes* and *E. Wickhami* are indicated as specifically distinct in the table of contents, and in the headings of the body of the work, but in the description of the latter the remark is made (on page 299) that "at most *Wickhami* can be only a race of *tenuipes*," which would, by Dr. Blaisdell's system, reduce the name *Wickhami* to varietal rank. On page

29 the heading, "Analytical Key to the Genera of Eleodiini," is somewhat misleading, since it includes also *Blaps*, of the Blaptini.

Nothing comparable to this monograph has ever been attempted by American coleopterists. It represents years of labour, largely of a most tedious nature, and the few oversights noted are undoubtedly due to interruptions of a busy professional life. We must rejoice that the author's enthusiasm survived the shock of the great San Francisco disaster, and welcome his work as a valuable contribution to the knowledge of a neglected but most interesting group of beetles.—H. F. WICKHAM.

Bulletin de la Société Lépidoptérologique de Genève. Décembre, 1905 ;
Décembre, 1906 ; Juin, 1908 ; et Avril, 1909.

Four numbers, completing the first volume of this important publication on the Lepidoptera, have been published. The number 4, April, 1909, has just been received.

It is an inspiration to read the annual address of the President, Mons. A. Pictet, telling of the aims, ambitions and accomplishments of this enthusiastic body of genuine, mostly non-professional, entomologists. It is just by that class of students, and in that spirit, that a great deal of the interesting and valuable biological work of the past has been done. This Society consists of four honorary members, eight charter members, one corresponding member, one life member, and forty-one active members. The Society has an auxiliary Society, called the "Album," consisting of their "jeunes amis," who have not attained the age limit, but are enthusiastic young collectors, who will eventually form the larger Society, in more advanced studies. The President calls attention to the "curieuse" abundance of blue females of several species of *Lycena*, in the canton of Geneva. This is of great importance to biology, as marking an approach to the disappearance of sexual dimorphism in the group. He then considers some factors which might have operated to produce this phenomenon, *i. e.*, conditions of weather in previous years, but he considers this as not a satisfactory explanation, and that we are powerless, in the present state of science, to explain the phenomenon. This would be a point of great interest to observe and study in this country. The President also speaks of the effect of feeding on the variation of several species of lepidoptera, and considers it of great importance in biology ; "là est un domain fécond en observations nouvelles, un champ vaste d'investigations." He then discusses an immigration of *Vanessa cardui* in 1906, and its consequences.

Following the President's address, the proceedings of the monthly "séances" are given, and the papers given and the discussions undertaken are of such interest, that one only wishes he could have been present.

The main body of this "fascicule" is made up of more or less lengthy contributions, which are of great interest to the students of insect bionomics. I will here just mention these:

Dr. J. L. Reverdin continues his studies of the forms *Erebia tyndarus* in Switzerland and Savoy.

Dr. Paul Denso continues his long studies, from the last two numbers of the Bulletin, on the hybrid palæarctic *Sphingidæ*, followed by a "Katalog der Schwärmerhybriden," 33 pages.

M. A. Pictet gives some notes on the biology of *Macrothylacia rubi*. A good number of new aberrations are described by Lacreuze, Blachier, Reverdin and Culot.

There are 394 pages to the complete volume, with 12 plates. An alphabetical index to the species, varieties, aberrations and hybrids mentioned in the volume, an index of the new things described, and an author-article index, completes this valuable contribution.

All lepidopterists and students of bionomics should have this volume, which can be obtained through the firm of R. Friedländer & Sohn, Berlin.

FORDYCE GRINNELL, JR.

EXTERMINATING FLIES.

"The best exterminating agent is a weak solution of formaldehyde in water, say two teaspoonfuls to the pint, and this experience has been confirmed by others. It would appear that flies are attracted by a weak solution of formaldehyde, which they drink. Some die in the water, others get as far only as the immediate vicinity of the plate of water, but all ultimately succumb, and where they occur in large numbers hundreds may be swept from the floor. It is consoling to know that by this method the flies have died under a dose of a fluid which is fatal to disease organisms, a fluid also which is inoffensive and for practical purposes nonpoisonous. The method at once provides a means of diminishing the scourge and of securing to some extent what is most desirable, the disinfection of the slain."—*The Lancet*.

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No. 12.

SOME GUESTS AT THE BANQUET OF BLOSSOMS.*

BY F. J. A. MORRIS, TRINITY COLLEGE SCHOOL, PORT HOPE, ONT.

In 1905, my first season of collecting, I went over to England at the end of June on a botany trip. I had already begun to watch for beetles on blossoms before leaving Canada, though my chief hunting-ground had been the bark of trees. In England I knew that the latter game-preserve was practically out of the question, as timber is far more scarce, and nearly all the woods are kept too clean for fallen timber to lie or wood to rot. If I meant to do any beetle-hunting, it must be by some other method, and I naturally made up my mind to combine hobbies by carrying a collecting-bottle out with me on my daily botanical rounds.

My first stay was on a small estate in Chislehurst, Kent. Here, in this garden within a garden, while wandering through a wood of hazel and oak I came on a large clump of tall umbellifers in full bloom. I knew already from Fowler's and other books that such blossoms were a favourite haunt of certain beetles, and I made my way cautiously along a hedge of rhododendrons towards the clump. As I did so, there rose from between my feet a dark brown hawk-like bird, that flew up into my face and hovered for some moments in front of me; it was a nightjar, the famous goat-sucker of popular superstition, menacing, but powerless to fulfil a threat, being, indeed, cousin-german to our night-hawk and whip-poor-will, with all the furtive movements and ghostly silence of the creatures that fly abroad by night and hawk beneath the light of the moon. Like the night-hawk, it builds no nest, but there among the round flint pebbles by an oak lay its pair of eggs.

When first I got to the clump of flowering plants and scanned their broad white discs of blossom, among numerous diptera and hymenoptera, nothing was to be seen except a few butterflies, but presently I saw a large black and yellow Longicorn settle on an umbel some distance off. On approaching I found two of the beetles feeding and succeeded in catching one in my hand. They were very active, as quick as sunflies and almost as wary, so that capture was far from easy. I managed, however, to get a

*Read at the Annual Meeting of the Entomological Society of Ontario, Guelph, Nov. 4, 1909.

second specimen some time after. They proved to be *Strangalia armata*; later on in the season I captured in North Wales a pair of *Strangalia melanura*, one on a composite, the other on a small umbellifer; and in Somerset, on the slopes of the Quantocks, I captured the more rare *Strangalia quadrifasciata*, sunning itself on a hazel leaf. The genus *Strangalia* is closely related to the *Leptura*, and, like that genus, with its near allies frequents blossoms. So far I have not found any in Canada, though some species are, I believe, not uncommon. From the wood I passed into the kitchen garden, for I remembered a bed of orpine or livelong (*Sedum telephium*) where, 25 years ago, I could be sure of some Red Admirals (*Pyrameis atalanta*) and an occasional Peacock (*Vanessa io*), but alas! King Orpine's days were numbered, and Salpiglossis and Montbretia reigned in his stead. However, I spied a bed of asparagus and went over to review its ranks. I soon found that ladybirds were glutting themselves on a small dark grub about the foliage; it was probably the grub of the asparagus beetle (*Crioceris asparagi*), for I found a number of the mature insects on the leaves. Though very small, this beetle is extremely beautiful when alive, the vertical lines and cross-bars which appear black in cabinet specimens being of a rich dark green in the living insect. It has a curious habit when alarmed of thrusting its antennæ straight forward in front of the head and remaining motionless like a pointer; this habit is found in not a few of the Chrysomelians, as in some of the Longicorns, notably the Saperdas. I saw no trace of the 12-spotted species (*Crioceris 12-punctata*); indeed, at the time I did not know it occurred in Great Britain; but in September, 1907, I found both species on some asparagus in the late Dr. Brodie's garden in Toronto, and the last two years I have found the latter species abundant in Port Hope. In Dr. Bethune's day, I understand, it had not yet appeared there.

During the rest of my stay in England I did not do much collecting, as the month of August forms a sort of interregnum in insect activity between the early and the late broods. But I returned to Canada fully determined to prosecute my search among flowers and foliage in the coming season. I knew, of course, that I should thereby restrict my captures mostly to two or three families of beetles—the Scarabs, Longicorns and Chrysomelians, but from some such form of amateur specialism I was not at all averse.

Accordingly, from early April in the spring of 1906, I was out and about whenever I got the chance. It was not till May that my efforts met with much reward. A species of *Ædemeris* that frequents the dogtooth

violet was almost the only capture. I had been told that a somewhat rare Longicorn was to be met with on the blossom of the trillium, but my informant could not tell me its name, nor did patient search in trilliums yield me any specimen of this family. About the 20th of May, however, blossomed the early elder, and though I wasted a great deal of time over elder clumps growing far away from woodlands, I did at last, by good luck, direct my steps to some growing on the edge of a wood about four miles north of the school. Here I found a new species of Scarab, leaden-gray in colour, though disguised for the nonce in a light yellow coat of pollen, with which it was thickly dusted over; it had long crooked hind legs that looked too clumsy to be of much use to their owner, and were, indeed, trailed along after it when it crawled. It was the male of *Hoplia trifasciata*, and I found it abundant for two or three weeks on the early elder, the choke-cherry and the hawthorn; at first only the males were to be found, but about a week later the females became common; these at first I took for a distinct species, as they are very different in colour, yellowish-white, with three irregular bands of brown across the back; on the hawthorn, however, where the female was in preponderance, I more than once found a pair. The same mistake appears to have made its way into print, and the two sexes were at one time assigned to distinct species, the male figuring as *Hoplia tristis*, and the female as *Hoplia trifasciata*. I found also on this clump of elder a few specimens of one of our earliest Lepturas, *L. ruficollis*; and, by way of a new illustration to the old adage that "it never rains but it pours," three specimens of what at first I took to be an ant, till on looking closer I saw the straight line down the back formed by the suture of the wing-covers and the gracefully curving antennæ that mark the Longicorn beetle. It was quite new to me, and my fellow-collector, though several seasons older than I, had nothing like it in his collection. There was nothing specially remarkable about its colour, which was blackish or dark gray, relieved by some transverse pencilled lines of white, and it was only $\frac{1}{3}$ of an inch in length, but there was an elegance of form and outline that made it long a favourite in my little collection. This enthusiasm in a grown man doubtless seems absurd to the uninitiated, and I must admit, somewhat ruefully, that I found myself an object of pity rather than envy when I "talked beetles" to a brother of mine who has misspent the last 20 years of his life tiger-hunting in Madras and bagging lions in Rhodesia, in fact, generally making ducks and drakes of all his golden opportunities to collect rare Longicorns from tropical blossoms.

In the identification of this insect occurred an episode that I hope Dr. Bethune will pardon me for introducing here. At the close of this season of 1906 I purchased a copy of LeConte & Horn's key to the genera of N. A. Coleoptera. By a somewhat rough process of elimination I had decided my beetle belonged somewhere in the tribe *Clytini*, whose most familiar representative is probably the famous sugar-maple borer, *Plagionotus speciosus*. LeConte & Horn's book made it probable that in the third group of this tribe, the *Anaglypti*, it would find its place. This group contains four genera, *Microclytus*, *Cyrtophorus*, *Tillomorpha* and *Eudermes*. Only one of these genera was at all known to me, and that from a single species (*Eudermes picipes*) somewhat resembling the subject of my examination. I found first of all that the beetle I was trying to place had no ivory marks on the elytra, which put *Eudermes* out of the question; the eyes were oblique and emarginate instead of round, which excluded *Tillomorpha*; it must be either *Microclytus* or *Cyrtophorus*, and the book gave me no choice, for in *Microclytus* the second joint of the antenna was equal to the fourth, while in *Cyrtophorus* the second joint was much shorter, as it obviously was in my specimens. My fellow-collector had already sent a box of unidentified specimens to Guelph to be named, and when they came back I was naturally eager to learn the result. To my chagrin I found my little favourite christened *Microclytus gazellula*. This so mystified me that at last I wrote to Dr. Bethune, explaining the quandary I was in. To my great relief I got an immediate reply, that the beetle sent him had been identified from a cabinet specimen named by an older collector. LeConte & Horn were right, my beetle was *Cyrtophorus verrucosus*, as were those in the Guelph cabinet, though hitherto wrongly named.

I have examined a number of cabinets, and in none of them yet have I found more than an odd specimen of this beetle, nor have I met a Coleopterist who had captured it, except accidentally, as it were. But on the blossoms of the early elder, still more those of hawthorn, sometimes of choke-cherry, dogwood, spoked maple, viburnum and New Jersey tea, from the middle of May till early in July, I have found it abundant. It is then replaced by its near relation, *Eudermes picipes*, which frequents blossoms all July, especially those of New Jersey tea and milkweed, though often met with also on certain of the rosaceæ and composites. It closely resembles *Cyrtophorus*, though considerably smaller and not so elegant in form; on the side of each elytron is a transverse white band, technically termed an ivory vitta; in the first specimens captured I did not recognize a new kind till I took them out of the killing-bottle.

This finding of a new species acts as a great incentive to the collector; not merely through the stimulus and encouragement of filling gaps in his cabinet, but through the interest and education of comparing closely-allied species and genera, and gradually following out the relationship of distinct tribes as the series of intermediate forms grows more and more continuous; thus retracing, as if were, the steps of natural evolution. It was, I know, a great encouragement to me to find the wide gap between, say, the Cyllenes and the Lepturas being gradually filled in and the various stages of the transition emerging, so to say, from the unknown. I believe it was the consequent redoubled efforts made by my fellow collector and myself the next season, more than mere luck, that brought us an interesting discovery in the middle of June. On a certain Sunday morning I captured on spiked maple a specimen of an ant-like beetle, obviously belonging to the *Anaglypti* group, but neither *Cyrtophorus verrucosus* nor *Euderces picipes*, and in the afternoon of the same day on hawthorn my friend captured a specimen of an ant-like beetle neither *Cyrtophorus verrucosus* nor *Euderces picipes*. Neither of us noticed his discovery till we came to turn out the contents of our killing-bottles on returning home. Stranger still, the new species we had captured, when we came to compare notes, proved different from one another. By a close examination of my friend's capture, I found he had at last got a genuine specimen of *Microclytus gazellula*. My capture has not yet been identified, but it may be referred almost certainly to the genus *Cyrtophorus*.

I have been led into something of a digression here, and for purposes of this paper I may remind you that we are in the month of May, and searching for beetle guests on the blossoms of the early elder. Through the middle of the wood where I made these first discoveries flows a small stream that has eaten out for itself quite a deep ravine through the limestone clay and marl. About 100 yards up this glen grows a large shrub of early elder that opens about the end of May; on its blossoms we got several more of the *Leptura ruficollis*, but nothing new that season. In 1907, however, while my fellow collector was examining the blossoms, he spied a new Longicorn, of which he captured three specimens, and a day or two later, from the same shrub I managed to get two. Though there were several other elder bushes in the wood, we have found this beetle on none of them, only on this one tree, and it has yielded us from three to five specimens every season since. As far as our experience goes, the beetle is active from the end of May till nearly the end of June. In 1907, from another locality I took two specimens on dogwood blossom;

in 1908 I got three or four specimens on dogwood and on the thimble-berry, and in the season just over we both saw specimens feeding on hawthorn blossoms. It is the *Pachyta monticola*, a very pretty insect with pale yellow elytra, boldly marked with black or deep crimson. This genus is closely related to the *Lepturas*, but broader across at the base of the elytra, and thicker through the sternum; its thorax, too, instead of being rounded at the sides, is armed with an excrescence known to Coleopterists as a "process." In 1907 and 1908 I succeeded in capturing a few specimens of two more species of *Pachyta*, smaller than *monticola*, and inconspicuous in colour, black, or black with dark brown streaks on the wing-covers. They were taken late in June, feeding on the blossom of a dogwood. And with every fresh discovery I swelled with pride as I found myself getting more and more intimate with this royal family among beetles, the Longicorns.

With the passing of May the early elder came to an end, but before it was over the hawthorns began to bloom all over the neighbourhood. Our first field of investigation *was* a field, an extensive pasture bordered on one side by a wood of pine, beech and maple. At first I went all about the farther end of the field wherever the snowy mass of a hawthorn bush in full bloom drew me, but I soon found that it was only near the wood that my search was rewarded; the first captures were a couple of Scarabs called *Trichius piger*, a beetle looking very much like a small bumblebee and extremely active; it is abundant on blossoms from early in June till the middle of July, and may be found on a great variety of flowers. Then I got my first specimen of *Dichelonycha elongata*, another Scarab, which is particularly fond of basswood foliage, and becomes some seasons a veritable plague. Finally I came to hawthorns on the border of the wood, and here I found several Longicorns feeding. Among them three *Lepturas* that were new to me, *Leptura pubera*, *L. mutabilis* and *L. vibex*, of the last two only a single specimen. About the same date I paid a visit to the wood four miles away, to see what guests the hawthorns there were entertaining. On one bush at the edge of the wood I found both sexes of *Hoplia trifasciata* plentiful, two or three specimens of *Dichelonycha*, and a lot of *Leptura ruficollis* and *Cyrtophorus verrucosus*; and besides these a new insect that at first I passed over for a fly, till the long antennæ betrayed it; these in the female were about the length of the body, in the male twice as long; it was the more easily mistaken for a fly in that its wing-covers were reduced to a mere pair of epaulets or shoulder pads. It proved to be the Longicorn *Molorchus bimaculatus*,

and was very abundant throughout June on several sorts of blossom. On another bush at the edge of the wood I found a regular colony of Chrysomelians busy in the blossoms. I sent three of these to Guelph, where they were identified as varieties of *Orsodacna atra*; in June, 1907, I found the same beetle on hawthorn blossom at Lakefield, and I have taken it also on viburnum; in no case did I find the normal form of *O. atra*, though a few of my specimens approximated very closely to it.

A curious feature about the hawthorn and its guests is that some shrubs apparently as favourably situated as others and in full bloom, were deserted and others crowded. It may prove that some species attract beetles and others do not; Gray's New Manual enumerates 65 species of hawthorn in N. A., while in Sargent's Monograph on the Cratægus in some parts of Ontario alone (as published in last year's Wellington F. N. Bulletin), no less than 95 species are distinguished. The results of closer determination in the species of plant hosts might prove interesting.

An encouraging thing about this sort of collecting is that seasons vary in the maturing of both hosts and guests, so that often you will find species frequenting blossoms that the year before they did not visit, and sometimes you will come across an entirely new insect. Two seasons ago, for instance, early in June, we found a strange beetle abundant on dogwood; it proved to be *Callimoxys*, a first cousin of *Molorchus*; in this genus the wing-covers are not short as in *Molorchus*, but awl-shaped, so that the inner margins do not lie together in a straight line. Again this last season I made a new find on hawthorn in the shape of a small oak-pruner (*Elaphidion*). Much, too, may result from search in a new neighbourhood; in 1906 I found scores of *Lebia furcata* (a small Carab of the Bombardier group) feeding on golden-rod about the margin of a swamp at Lanark, and last July I captured two fine specimens of the large blister beetle, *Pomphopaea Sayi*, in Muskoka, upon nannyberry (*Viburnum lentago*).

When the hawthorn began to bloom in 1907, I went eagerly back to work my claims, for the bloom of a hawthorn lasts barely a week, and seems to attract insects for only a day or two. I had already ruled out the shrubs growing in the open; so I went first to the edge of the wood, but this faced west, and was exposed to a chilly wind. There was nothing to be found, and I followed the gleam of hawthorn north across some stump lands to a large wood; skirting its west and north border, I came presently to a stretch of low swampy ground that penetrated the wood in a southerly direction, and was entirely out of the wind. It was thickly grown with dogwood and spiked maple, both of which were in the prime

of their bloom, and in full sunshine. The number of insects feeding on the blossoms was astonishing; in an hour or two I must have captured several hundred beetles. Besides *L. ruficollis* (with its variety *sphaericollis*), *L. vibex* was plentiful, and so was *L. mutabilis*, whose name now for the first time became clear to me, both forms being abundant, the light brown and the dark gray; I found also a very small *Leptura* that was new to me (*L. subargentata*), and the beetle, *Encyclops coerulea*; there were also a few specimens of *C. verrucosus*, and it was then that I got my unidentified species of *Cyrtophorus*. There were, of course, other families of beetles; in particular, Elaters, of which I captured four new species, one of which I have never seen except on spiked maple, the head and thorax dark brown, ending in a reddish-brown base, the elytra yellow-green, tipped with dark brown. On the same blossom in another locality I have taken three more Elaters, *Corymbites hieroglyphicus*, *C. propola*, and a third species not yet identified, prettily marked with dark wavy lines across the wing-covers; besides these, yet another *Leptura* (*L. 6-maculata*). *L. vibex* seems fairly to revel in these moist woody hollows, and later on in the same place on black elder I found *L. lineola* abundant. It is evidently addicted to black elder, and partial to moist woodlands.

As June drew to its close we extended our search to the south slope of a long ridge of high land, some 6 miles north of P. H. On this slope grew the New Jersey tea, and as there were many groves of standing timber, as well as berry patches and thickets of small trees and shrubs, we felt confident that we should make some finds. Our first visit to this place (which we dubbed "the Rocky Mountains") found the New Jersey tea still some days short of blossoming, but there was dogwood in bloom on the slopes, and almost the first bush we visited brought us three or four new beetles, among them *Gaurotes cyanipennis*, of the Lepturoid group, a stout, robust beetle, resembling in form *Pachyta monticola*, very handsome and of a brilliant dark green hue, and *L. capitata*, a beetle we at first took for *ruficollis*, but more tapering in outline, and with head crimson as well as thorax.

With the first days of July, along the southern slope of our local Rocky Mountains the New Jersey tea and late elder expanded to the sun, and the whole hillside became a revel of insect life. The delicate fragrance of the New Jersey tea would no doubt at any time attract guests to its dainty white clusters, but coming, as its blossoms do, jump with the height of insect activity, and in the most glorious weather of the year, the sun blazing through a breathless atmosphere, the number and

variety of guests swarming to the feast were almost beyond belief. Sometimes an altercation would arise, when some blundering glutton (like *Bombus* or *Trichius*) tried to elbow his way into a blossom where there was no longer standing room. But "with them," as Wordsworth points out, "no strife can last."

"For why?—because the good old rule

"Sufficeth them—the ancient plan

"That they should get who have the power

"And they should keep who can,"

—and the weakest go to the wall.

Among the many new species we met with in these happy hunting-grounds were several members of the group *Clyti*, between the *Cyllenes* and the *Anaglypti*; of this group we found an occasional specimen of *Xylotrechus colonus*, and a small *Neoclytus*, while *Clytanthus ruricola* was abundant. In the Lepturoid group we took many specimens of a genus we had not found at all before, *Typocerus*, of which we met with three distinct species, one black (*T. lugubris*), one black and yellow, banded like a wasp (*T. sparsus*), and a third mottled with patches of straw-colour and reddish-brown (*T. velutinus*).

In midsummer heat insects seem to grow nervously alert and restless, and we found the *Typocerus* often defied capture; they would hover at a blossom without settling, like miniature humming birds, their tiny wings fanning with marvellous velocity, while their flight from one point to another was of the swiftest. A small beetle in flight is never conspicuous, and some of them when they settle on a blossom seem to have stepped out of the infinite, and when they take to flight again they pass away into a 4th dimension, as though, like Wordsworth's skylark, they too enjoyed a "privacy of glorious light," but one that needed no soaring to gain. More than once we found with birds of this feather that one in the hand was by no means worth two in the bush; there proved many a slip between the cup of one's closed first and the lip of the cyanide bottle.

To the Lepturas themselves, already a long list, we added *L. subhamata*, *zebra*, *vagans*, *proxima*, *biforis*, *vittata*, *Canadensis*, and three species, at least, unidentified. Of these, *proxima* and *subhamata* seem to prefer the elder, and *Canadensis* the milkweed. In the same neighbourhood, from the heart of a dogrose I flushed an *Oberea bimaculata*, and from plants of the wild bergamot, with its sweet fragrance and delicate lavender blossoms, a whole covey of some smaller *Oberea* that I have not yet identified. I say "flushed" advisedly, for in the first instance I did not

bag my bird ; indeed, I chased it for two years before I caught it (the species, that is, not the individual). It is a small insect, of very narrow outline, and black in colour ; when flying it is almost invisible, only the practised eye can make out a minute and swiftly-moving shadow. You will get some idea of the hunter's difficulties when I say that I found it fatal to wink the eye while marking its flight ; the creature simply disappeared like the skylark at the last point of vision. For one thing, it has a dodging flight, like that of a snipe, and to make its assurance of escape doubly sure it never settles on the upper side of a leaf, but always underneath. Even then it is seldom off its guard ; if you cast so much as a shadow, it is off like a trout in a pool. I tell you there was rejoicing in the camp, if not feasting, when I came home with the scalp of *Oberca bimaculata* at my belt.

But in so fair a scene as the Port Hope Rocky Mountains, disappointments cast but a passing shadow. The place was a perfect Paradise of flowers, and as we wandered in sunshine beneath the vaulted blue, over beds of New Jersey tea, through thickets of raspberry and thimbleberry, among brackens and orange lilies, by fences festooned with grapevine and smothered in dogrose, everywhere a riot of blossom and insect life—Nature transfigured with the glory of the July sun, we thought of the wonderful interdependence of all living things on earth, and felt—I hope I may say it without irreverence—that it was good to be there.

“ Such life there, through such lengths of hours,

“ Such miracles performed in play,

“ Such primal naked forms of flowers,

“ Such letting Nature have her way

“ While Heaven looks from its towers !”

THE FAMILY NAME LYGÆIDÆ.

Dr. Bergroth (CAN. ENTOM., Nov., p. 405) seems to think that Mr. Kirkaldy has shown that *Lygæus* is a Coreid. I do not consider that he has shown it at all. Kirkaldy states in the “ENTOMOLOGIST,” 1899 and 1900, that Fabricius, in 1794, fixed the types of *Lygæus*, *Coreus*, etc. Fabricius does not fix nor indicate any types whatever in these genera, all containing many species. No type was indicated until 1801, when Lamarck, *Système Anim.*, p. 294, says : “Corps oblong, un peu étroit (Ligæi, Fabr.). *Cimex equestris*, Lin. *Ligæus equestris*, Fab.” *Equestris* was an originally-included species, and therefore is the type. This leaves *Lygæus* as it is in the Leth. and Severin Catalogue.—N. BANKS.

PHYLOGENY OF THE LITHOCOLLETID GROUP.

(Preliminary Survey.)

BY ANNETTE F. BRAUN, UNIVERSITY OF CINCINNATI, OHIO.

Of the descent of this group—*Cremastobombycia*, Braun; *Lithocolletis*, Hbn. (*Phyllonorycter*, Hbn.); *Cameraria*, Chapman; *Porphyrosela*, Braun—from Gracilariad ancestry there seems to be no question, but the exact phylogenetic relationship of the constituent members remains in some doubt. Especially so is this true of the group possessing abnormally flattened larvæ, *Cameraria*, Chapman, a remarkably homogeneous complex of species, both in larval and imaginal structure and in type of markings.

In order to understand the basis of some of the recently proposed theories of the descent of this group, it is necessary to review briefly some of the details of structure in the early larval stages upon which such classification rests. The principal structural larval character possessed in common by their Gracilariad ancestor and by the groups assumed to be descended from it, is that all have at least two so-called Gracilarian instars. The first two in *Gracilaria* and the first three in the Lithocolletid group are of this character. Dr. T. A. Chapman, in his admirable paper entitled "The Classification of Gracilaria and Allied Genera" (THE ENTOMOLOGIST, 1902, pp. 81-88, pp. 138-142, pp. 159-164), has discussed the significance of this character as showing the descent of these genera from Gracilariad ancestry, and as a taxonomic character, where it is extended into the third instar, as is the case in *Cremastobombycia*, *Lithocolletis* (typical), *Porphyrosela*, and as he supposed, erroneously, however, into the fourth and fifth instars of the flat-larval group. It is just with regard to this point that errors in the observations of previous workers, notably Chambers (Jn. Cin. Soc. Nat. Hist., II, pp. 79-93, 1879), have resulted in the flat larva being regarded as more widely divergent from the ordinary form in the latter instars than is actually the case. The true Gracilarian larva, as it exists in the first three instars, possesses unusually large labrum and labium with but very rudimentary labial palpi, flattened mandibles, able to cut only the substance of the leaf directly in front of them, and no maxillæ that can be detected, except as represented by indistinct lines on the mandibles. With the third moult of the so-called cylindrical larva, the *structure* and *form* change to the normal type, with all the mouth-parts present. This change in *structure* occurs with the third moult in the flat group also, but the flattened *form* persists, and the

larva continues to feed, as in the first three stages, by separating the epidermis and increasing the extent of the mine. A comparison of the lower figure, which represents the head of a flat larva in the fifth instar,



FIG. 12.—Upper left hand: Head of cylindrical larva. Upper right hand: Head in Gracilarian stage. Lower figure: Head of flat larva (*lr* labrum; *m* mandibles; *m. p.* maxilla and maxillary palpus; *l* labium; *l. p.* labial palpus; *a* antenna; *o* ocelli).

with the upper ones, the left of which represents the head of a larva of the cylindrical group in the later stages, the right that of a typical Gracilarian stage (third instar) of one of the cylindrical group, will show that there is a greater structural difference between the fourth and fifth instars of the flat larva and the true Gracilarian instar than there is between the flat larva and the ordinary cylindrical larva, where the difference is more quantitative than qualitative. The fact that maxillæ and maxillary palpi

are plainly present in the fourth and fifth instars of the flat larva shows that these are *not Gracilarian* instars.

However, even conceding that there is no great structural difference between the types of larvæ, the very appreciable modification of form in the fourth and fifth instars and the non-functional character of the mouth-parts in the sixth and seventh instars of the flat group still await explanation. Remembering that the imagoes of *Lithocolletis* (typical) and *Cameraria* are structurally identical, the question resolves itself into a consideration of how much reliance should be placed upon these larval characters in determining the phylogeny. It is true that in the absence of imaginal characters, larval characters may furnish a basis of classification, but before accepting the testimony they afford as final, we should examine them critically to determine whether they represent the phylogenetic divergence of the group or are merely cenogenetic larval modifications adapting that group to different life conditions.

A phylogenetic tree which shows the independent origin and parallel descent of two groups, distinguished by the larva of one being flattened, the other cylindrical, must be based on the assumption that, e. g., those characterized by a flattened larva are descended from genera or groups, now extinct, which possessed this characteristic. This line of reasoning rests on the hypothesis, which has repeatedly been shown to be unreliable for free-living larval forms,* that the individual recapitulates in its ontogeny, the history of the race. This, it seems to me, is the fundamental weak point in such a phylogenetic tree as that proposed for the group under discussion by Mr August Busck (Proc. Ent. Soc. Wash., XI, 100, 1909). On the other hand, we are justified in concluding that the common possession of at least two Gracilarian instars is proof, additional to that furnished by the imagoes, of the common descent of the group from Graciliariad ancestry, because this characteristic has been handed down through so many modifications of imaginal structure and environmental conditions that it may well be assumed to be conservative. In the flat-larval group, we have no such basis of comparison to determine whether the later two flattened stages constitute such a conservative character or not, and hence can not accept the evidence afforded by the ontogeny.

If the flattened form of the larva in the fourth and fifth instars and the slight modification of mouth-parts in the sixth and seventh instars,

*See Montgomery, "The Analysis of Racial Descent in Animals."

where they are not functional for feeding, are not phylogenetic characters, what explanation is there of their structure? This is manifestly adaptive, and this view is supported by the following arguments:

1. There is an obvious advantage in the flattened and projecting labrum as an aid in separating the epidermis combined with the undoubted specialization of the mandibles, which, however, is not as extreme as in a true Gracilarian instar.

2. This specialization is correlated with the mode of life, and ceases when the mode of feeding which produced it comes to an end. The animal kingdom affords us abundant instances of species which undoubtedly are closely related within the same genus, one of which possesses a specialized larval form not present in the other, which is correlated with different larval habits.

3. The period of wrinkling the loosened epidermis by means of the silk spun across it, which takes place in the cylindrical group in the fourth instar, takes place in this group in the sixth instar, after the period of feeding has passed, which may account for the partial degeneration of the mouth-parts in the sixth and seventh instars. Why there should be two instars of the character of the sixth, remains to be explained, but it may be suggested that these may be periods of development, in which the larva approaches the normal form.

More important than these, perhaps, are the structural gradations which are disclosed by the examination of larvæ of species of the cylindrical-larval group, which in larval habits and type of markings approach the flat-larval group. This feature will be discussed in a future paper.

Are the differences sufficient to constitute a division of generic rank, which has originated early from Gracilariad stock? Have we not here to deal with a group in the process of differentiation, rather than a genus already formed and isolated, since it is by adaptation and the *resulting* change of structure that the group will finally be isolated?

That the flat-larval group is, it seems to me, a more recent development than the typical *Lithocolletis*, is shown by its restricted geographical range (compared with that of the typical *Lithocolletis*), and the comparatively slight variation in the marking, together with their remarkable resemblance to the type of markings characteristic of *Cremastobombycia*. In determining the descent, two possibilities present themselves. The first is that *Lithocolletis* (typical) is an earlier offshoot from *Cremastobombycia*, either from stock somewhat different from the modern

Cremastobombicia, or if from an ancestral *Cremastobombicia*, resembling those now in existence, the connecting links have to a greater or less extent been lost. The second possibility is that the flat and the cylindrical-larval groups have descended in diverging directions from a common ancestor, an offshoot of *Cremastobombicia*. These two paths of evolution may be illustrated diagrammatically thus (Fig. 13):

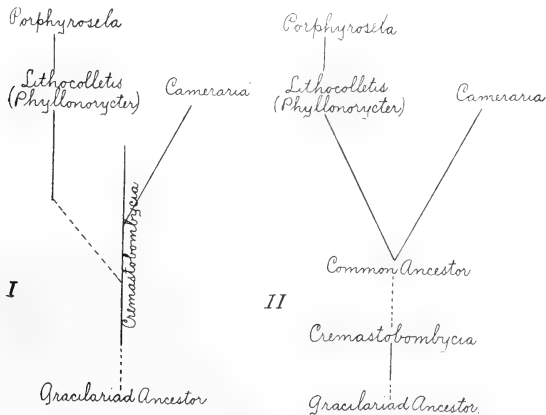


FIG. 13.—Phylogeny of the Lithocolletid Group.

Either of these two views indicates a close relationship between the two groups; if the second should prove the correct one, *Lithocolletis* (typical) and *Cameraria* should certainly not be separated generically. At the present stage of the investigation the evidence connecting the flat-larval group with *Cremastobombicia* is somewhat more complete than that connecting *Lithocolletis* (typical) with either.

NOTE ON SPHINX PERELEGANS, HY. EDWARDS, IN BRITISH COLUMBIA.

BY REV. G. W. TAYLOR AND ARTHUR GIBSON,

For some years the senior author has collected at Wellington, British Columbia, odd specimens of a handsome, large, blackish sphinx, which until a recent visit to Ottawa he had not personally studied. On this

occasion, however, the specific standing of the specimens in question was investigated, and we have now come to the conclusion that the species is *Sphinx perelegans* of Henry Edwards.

With five specimens before us, three of which are in splendid condition, we have carefully gone over the descriptions of *perelegans*, *Vancouverensis*, *Vashti* and *albescens*; the specimens agree perfectly with the description of the first-named species. Four of the specimens are from Wellington, B. C. (6, 7, VI, '03), and the other from Peachland, B. C. (6, VII, '07, J. B. Wallis). Four are males; 3 expand $3\frac{5}{8}$ inches and the other $3\frac{3}{8}$ inches. The female expands 4 inches.

Sphinx perelegans was described from Gilroy, Santa Clara Country, Cal. This note of the species occurring in British Columbia is an addition to the Sphingidæ of that province. In fact, the record is a new one for Canada.

The insect is by no means common in British Columbia, and not more than a dozen specimens are known to have been taken during the last 10 years.

APHIDES ON GLADIOLUS.—In the 24th Report of the State Entomologist on Injurious and Other Insects of the State of New York, 1908, pages 19–22, Dr. E. P. Felt discusses, describes and figures a new species of Aphis affecting gladiolus bulbs.

From a reading of Dr. Felt's paper one might be led to infer that the occurrence of aphides on bulbs of gladiolus had been observed but recently. I think it was in the spring of 1894 that I observed an aphid in considerable abundance infesting gladiolus bulbs offered for sale by florists in Cleveland, Ohio. Not being able to obtain winged adults, the fact of this occurrence was never published. On July 21, 1894, aphides were found upon the leaves of the growing plants, and an attempt was again made to secure winged adults for identification, but resulted only in another failure. From this material, however, a Hymenopterous parasite was reared on Aug. 8th of the same year, which was determined by the late Dr. Ashmead as *Praon Coloradensis*, Ashm. (See 13th Ann. Rep. Ohio Agr. Exp. Sta., 1894, p. 39.) It is, of course, impossible to say that either of these aphides belonged to the species just described by Dr. Felt, although the one on the bulbs might quite likely have been identical; but the observations are now placed on record as showing that the occurrence of aphides on these beautiful flower-plants is by no means recent.—F. M. WEBSTER, Bureau of Entomology, Washington, D. C.

THE EUPITHECIÆ OF EASTERN NORTH AMERICA.

No. 3.

BY GEO. W. TAYLOR, NANAIMO, B. C.

Since I began my paper on the Eupitheciæ of Eastern North America (the completion of which has been delayed by my continued illness), much attention has been given to the group by our students of Geometridæ, now quite numerous.

In consequence of their studies and my own further investigations, I have to amend some of the statements made in the earlier parts of this paper.

I have now good specimens of *scriptaria*, H.-Sch., *gelidata*, Moeschler, and *hyperboreata*, Staudinger. They appear to me to be distinct species, and not any of them to be referred to *E. nanata*.

Coagulata, Guénee, is the name I retained for the form represented by the ♂ type of Packard's *geminata* (Monograph pl. VIII, fig. 2), and Mr. Grossbeck (Ent. News, XVIII, p. 347), agrees with me as to this. Mr. Pearsall, however, has redescribed the form as *E. meritata* (Ent. News, XIX, p. 195).

With regard to *E. miserulata*, Grote, several articles have lately been written, and from them it appears that Messrs. Grossbeck, Pearsall and Swett are all agreed to give the name to a part of Hulst's *E. nebulosa*.

I had come to the conclusion that a quite different insect (since named *Swettii* by Mr. Grossbeck) was the one from which at least a part of Grote's description was drawn. I still feel quite confident that I am right, but as I am also sure that the description being poor and probably drawn up from several "types" not conspecific, and all the types being lost, it will never be possible for my position or Mr. Grossbeck's to be absolutely proved. No dependence can be placed on a supposed type "entirely without label," nor can we rely on specimens named by Grote for various collectors, as he admitted that *all* his eastern Eupitheciæ stood under the one name. I am therefore content that in this case the majority shall rule, and henceforth I shall call the form indicated by Messrs. Grossbeck and Pearsall (= *nebulosa*, Hulst, pars, = *Grossbeckiata*, Swett), *miserulata*, Grote, and the form I had identified as *miserulata* will stand as *Swettii*, Grossbeck.

E. luteata, Packard.—Never having seen Packard's types, I naturally accepted Packard's own statement that *luteata* and *palpata* constituted but

one species. I was confirmed in this view by Mr. Swett, who assured me that he had compared the types.

However, as Mr. Swett now says that the two species as represented in the Packard collection are quite distinct, and Mr. Grossbeck, who has also studied the types (Ent. News, XVIII, p. 344), agrees with him, I suppose we must retain both names on our lists.

E. implicata, Walker.—It appears that the type specimen of this species, which has been re-examined for me by Mr. Prout, is not the same as *anticaria*, Walker. It is a form very nearly allied to *E. latipennis*, Hulst; but for the present I hesitate to unite the two.

I have now to deal with the species described by Mr. Hulst. They are only five in number :

1896. *nebulosa*.

1898. *latipennis*.

1896. *inornata*.

1900. *plumbaria*.

1896. *fumosa*.

(It will be noted that an interval of 20 years separates Packard's latest and Hulst's earliest descriptions.)

With regard to *nebulosa*. I have always considered that the Texan types—there is one of them in the U. S. National Museum—more nearly agreed with Hulst's description than the New York and New Jersey types which are still in the Hulst collection. I have therefore retained Hulst's name, *nebulosa*, for these Texan specimens in my own collection. Those who think that this form is the same as the Atlantic Coast form will, of course, place both together under the name *miserulata*.

The type of Hulst's next species, *inornata*, has been shown by Mr. Pearsall (CAN. ENT., XXXIX, p. 143), to be a worn specimen of *Euchaeta perlineata*, Packard, and the name will therefore be dropped from our lists.

Fumosa, Hulst, is discussed by Mr. Grossbeck (Ent. News, XVIII, p. 348), and is apparently a good species of the *absinthiata* group. If I have rightly identified it, I have it from Ottawa and Montreal.

Latipennis is a good species, and one of the commonest (in Canada ranging from Quebec to Winnipeg). It was originally described from a specimen taken at Quebec by Mr. Hanham, and through the generosity of that gentleman this type is in my collection. How Mr. Hulst came subsequently to confuse this species with *E. albicapitata* is more than I

can say, but according to Mr. Grossbeck (Ent. News, XVIII, p. 347), this is what he did.

Latipennis is nearly allied to *E. castigata*, which replaces it in the west, and also to *E. implicata*, Walker, with which, as I have said above, it may be identical.

The last of Hulst's species is *E. plumbaria* (CAN. ENT., XXXII, p. 102). This is very inadequately described. The type, however (taken in the District of Columbia, July 5), is still in the U. S. National Museum, and is in fair condition. It is a small species of the group of *E. Frostiata* and *E. conformata*, but I have not been able to match it with any specimens in my own collection. This group is either made up of a number of nearly allied species or of one very variable one. My material is not sufficiently large to enable me to determine this point to my satisfaction.

Since the publication of Dyar's List 13 additional species have been described from eastern localities.

In order of publication these are :

1906. Youngata, Taylor.	1908. filmata, Pearsall.
1907. Fletcherata, Taylor.	1908. Catskillata, Pearsall.
1907. Swettii, Grossbeck.	1908. erpata, Pearsall.
1907. Taylorata, Swett.	1908. meritata, Pearsall.
1907. Frostiata, Swett.	1908. Russellata, Swett.
1907. Grossbeckiata, Swett.	1908. Brauneata, Swett.
1908. conformata, Pearsall.	

The first three are good species and very distinct, *Taylorata*, *Catskillata* and *Brauneata* I have so far failed to identify among the forms in my collection.

Grossbeckiata is a redescription of *nebulosa*, Hulst (part), and therefore sinks to *miserulata*, Grote. *Frostiata* is a good species, but *conformata* and *Russellata* are evidently, from the descriptions, very near to it, though I would hesitate to unite them without actual comparison of the types. *Filmata* is a very distinct form, well characterized by Mr. Pearsall. On the other hand, *meritata* is the same as *coagulata*, Guénee, as represented by Packard's smaller ♂ type of *geminata* and *erpata*, seems to me very close indeed to *palpata*, Packard, but here again I am judging merely by the published descriptions, not having seen the types. It now remains for me to make some additions to our lengthening list.

In the first place there are two European species that I think can now be credited to our fauna.

One of these is *Eupithecia togata*, Hubner. This name has already appeared in the check list of British Columbian Lepidoptera on the strength of specimens taken by me at Victoria and Wellington, but I have lately seen specimens from Digby, Nova Scotia (John Russell), and one was also taken by Mr. Prout near Quebec on the occasion of his visit to this country two years ago, so that it can now take its place on the eastern lists also.

E. togata is like a very large *E. albicapitata*, and may be in some collections under this name. This species is said by Hulst (Trans. Am. Ent. Soc., XXIII, p. 272), to be the type of the genus *Encymatoge*.

The other European species to be added is *E. albipunctata*, Haw. Mr. H. H. Lyman is the discoverer of this form. He bred three specimens from larvæ found near N. W. River, Ungava, in 1905, and very generously gave one of them to me. It is undoubtedly a small specimen, probably dwarfed though insufficient food supply, of the European species. It can be distinguished at a glance from any other of our American species by the way in which the submarginal white line, instead of being continuous, is broken up into spots, the most conspicuous of which are situated between veins one and two, and three and four of both the fore and hind wings.

The descriptions of a number of forms which I suppose to be new are reserved for the next number.

THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The forty-sixth annual meeting of the Society was held at the Ontario Agricultural College, Guelph, on Thursday and Friday, November 4th and 5th. During the day meetings the chair was taken by the President, Mr. Tennyson D. Jarvis, and at the evening session by Dr. Bethune. Amongst those present were: Messrs. H. H. Lyman and A. F. Winn, Montreal; Dr. C. G. Hewitt and Mr. Arthur Gibson, Central Experimental Farm, Ottawa; Mr. John D. Evans, Trenton; Mr. F. J. A. Morris, Trinity College School, Port Hope; Dr. E. M. Walker and Messrs. C. W. Nash and J. B. Williams, Toronto; Mr. R. C. Treherne, Grimsby; President Creelman, Profs. C. A. Zavitz, H. L. Hutt, R. Harcourt, S. B. McCready, C. J. S. Bethune, Messrs. Jarvis, Howitt, Cæsar, Eastham, Crow, Klinck, of the staff, and a large number of the students of the Ontario Agricultural College and the Macdonald Institute, Guelph.

The proceedings began on Thursday afternoon with the reading of reports by the Directors on the insects observed in their respective

districts during the past season. Mr. Gibson, who represents Ottawa, described the unfavourable character of the season for many insects, but reported Grasshoppers and Aphids as extremely numerous. He also referred to the destruction of a number of cut-leaf birch trees by the Red-necked Borer. Mr. Williams and Mr. Nash gave reports on the Toronto district, and referred to the unsatisfactory nature of the work that is being carried on in order to control the Tussock Moth on the shade trees of the city of Toronto. Mr. L. Cæsar gave a paper on "Some Insects of Economic Importance," referring to the extension of the San José Scale to the county of Prince Edward, the work of a Blackberry Saw-fly, Spruce Gall-louse and a variety of other insects. The papers were discussed in an interesting manner by a number of those present. Mr. Lyman read a paper on "The Origin and Diffusion of Entomological Errors," confining himself to the Lepidoptera. He stated that coloured plates were a frequent source of error, and that occasionally collectors sent their specimens to experts to be named, retaining what they supposed to be duplicates. These were often different species, and it sometimes also happens that the numbers used for identification were transposed, either by the sender or the recipient. The third class of errors was due to typographical mistakes, a number of instances of which he mentioned. Mr. Gibson spoke of the importation of the Brown-tail Moth on French nursery stock in Ontario during the last winter. As soon as their presence became known a thorough examination was made. Over a million plants were inspected, and 186 nests containing living caterpillars were found. These and the packages which contained them were burned, and since then no examples have been found.

In the evening a public meeting was held in Massey Hall Auditorium, which was well filled with students, both male and female, and a number of visitors from the town, as well as members of the Society. Dr. C. Gordon Hewitt, the newly-appointed Entomologist at the Experimental Farms of the Dominion, gave a highly interesting and instructive address, illustrated by a series of admirable lantern pictures, on "House Flies and Their Allies." The College orchestra added much to the enjoyment of the evening by the musical selections they rendered. A very hearty vote of thanks to Dr. Hewitt was moved by President Creelman, and a general feeling of pleasure was expressed that so talented an entomologist had been selected to fill the place of the late lamented Dr. Fletcher.

During the second day, Friday, November 5th, meetings were held during the morning and afternoon in the Entomological Lecture-room, and

were well attended by members and students. The reports of the Council, Officers and Branches of the Society were presented and read. The President, Mr. T. D. Jarvis, read the annual address, in which he especially referred to recent publications and other work accomplished during the past year. A paper by the Rev. Dr. Fyles, of Hull, on "Adaptations in Insect Structure," was read; and a paper on the "Parasitic Work on the Gypsy and Brown-tail Moths in Massachusetts," by Mr. J. D. Tothill, a fourth-year student at the College, who spent last summer in the work at the Laboratory, Melrose Highlands, Mass. In the afternoon the following papers were read: "The Spruce Bud-moth," by Mr. A. Gibson; "Nursery Work in Ontario," by Mr. R. C. Treherne; "The Larch Saw-fly," by Dr. Hewitt; "A New Heliothid from St. Hilaire, P. Q.," by Mr. Winn, who also exhibited an excellent implement for digging out larvæ and pupæ, which consisted of a trenching tool served out to the U. S. soldiers at the time of the Spanish-American war. Dr. Bethune gave an account of some of the insects of the year in Ontario. These papers were discussed by a number of those present. They will be published in full in the forthcoming annual report.

The election of officers for the ensuing year resulted as follows:

President—Tennyson D. Jarvis, B.S.A., Lecturer in Entomology and Zoology, Ontario Agricultural College, Guelph.

Vice-President—Edmund M. Walker, B.A., M.D., Lecturer in Biology, University of Toronto.

Secretary-Treasurer—J. Eaton Howitt, B.S.A., Demonstrator in Botany, O. A. College, Guelph.

Curator—Lawson Cæsar, B.A., B.S.A., Demonstrator in Entomology and Plant Diseases, O. A. College, Guelph.

Librarian—Rev. C. J. S. Bethune, M.A., D.C.L., F.R.S.C., Professor of Entomology and Zoology, O. A. College, Guelph.

Directors: Division No. 1.—Arthur Gibson, Department of Entomology, Central Experimental Farm, Ottawa. Division No. 2.—C. E. Grant, Orillia. Division No. 3.—J. B. Williams, Toronto. Division No. 4.—C. W. Nash, Toronto. Division No. 5.—F. J. A. Morris, Port Hope. Division No. 6.—R. S. Hamilton, Collegiate Institute, Galt. Division No. 7.—R. C. Treherne, Grimsby.

Delegate to the Royal Society—Rev. Dr. Fyles, Hull, P. Q.

Auditors—Prof. S. B. McCready and J. W. Crow, B.S.A., O. A. College, Guelph.

A NEW SPECIES OF PTEROMALIDÆ.

BY A. B. GAHAN, ASST. ENTOMOLOGIST, MARYLAND EXPT. STATION.

Forster in 1856 characterized the new genus *Coelopisthia*, (Hymen. Studien. II, 1856, p. 65) using as the type Walker's species, *Pteromalus cephalotes*, described by that author in 1836 from the Isle of Wight (Entom. Mag. III, 1836, p. 481). In 1878, Thomson described another European species, *C. vitripennis* (Hymen. Scandin. V. 1878, p. 16). These constitute all the species of the genus recorded up to the present time. It is my privilege to now describe a third species, the first occurring in North America. It is readily distinguished from those previously described by the large fuliginous spot on the fore wing.

Coelopisthia fumosipennis, n. sp.—Female: Length 2.3 mm. Aeneous. Head broader than the thorax, densely and coarsely punctured; eyes black; scape two-thirds as long as flagellum, yellow; pedicel longer than first two joints of flagellum, yellow; flagellum black. Prothorax, mesothorax except axillæ and scutellum which are shagreened, and metathorax, coarsely and densely punctured, the latter with a distinct median carina. Anterior wings except basal one-third and a broad margin at the apex fuliginous; posterior wings hyaline, iridescent. Legs pale yellow, slightly fuscous at apex of femora; the coxæ are metallic green. Abdomen smooth, shining black with cupreous reflections.

Described from three female specimens reared from Lepidoptera pupa, College Park, Maryland, July 27th, 1908. Two of the type specimens are deposited in the United States National Museum, the third in the collection of the Maryland Experiment Station.

Identified as a new species by Mr. J. C. Crawford, of the United States National Museum, to whom the writer extends his thanks for this as well as many other courtesies.

THE EDWARDS COLLECTION OF BUTTERFLIES.

"A very interesting personal note occurs in the current number of the CANADIAN ENTOMOLOGIST, to the effect that the late Mr. W. H. Edwards, finding himself without the necessary funds to publish the third volume of his 'Butterflies of North America,' contemplated offering his collection of North American butterflies to the Trustees of the British Museum, in order to secure the money to enable him to go on with his work. To prevent the types of his species going out of America, Dr. W. J. Holland offered to pay the bills for the publication of the third

volume of the 'Butterflies of North America' as they became due, on the condition that the collection should be handed over to him when the studies were completed. This was done, and to-day Edwards's entire collection forms a part of Dr. Holland's own private collection, which is now deposited in the museum of the Carnegie Institute in order that it may be made available with other collections for purposes of study on the part of students.

"Whilst fully appreciating the public spirit of Dr. Holland, it does seem pitiful that the best work ever done by an American lepidopterist was so ill-supported by the entomological public for whom it was written, that the author not only had to give his life's work as a labour of love, but also had to part with his collection, with all its personal and sentimental ties, in order to give to an entomological world a work that it could not even appreciate to the point of paying for the actual mechanical labour expended by printers, lithographers, etc., in its production, an entomological public that took, in addition, without payment, the years of labour spent by the author, in amassing material, breeding and curating the specimens, describing their early stages, etc. Such work is sometimes called, as we have called it above, a labour of love. This may be excellent sentiment, but it appears to us to be amazing nonsense in such a case as this. A labour that ended in Edwards handing over his collection, under the conditions above described, must have sapped his entomological life's blood. No wonder we read in the notices of his death in the American magazines, that, for the last 20 years of his life, Edwards gave up the study of entomology, and took to the study of Shakespearian literature. Dr. Holland's statement allows us now to picture clearly what entomology lost by the failure of individual entomologists to support the best work on lepidoptera that America ever produced. Possibly, at least, two more volumes like the others might have been produced, had they both been supported, and in their place we have a wordy warfare as to how Shakespeare's name ought to be spelt!!"—The Entomologists' Record and Journal of Variation, London, England—October 1909, pp. 239-240.

MEETINGS DURING CHRISTMAS WEEK.

The American Association for the Advancement of Science and the various societies affiliated with it, will meet at Boston, Mass., during the week beginning Dec. 27, 1909. The Association of Economic Entomologists will hold its meetings on the Tuesday and Wednesday, and the Entomological Society of America on the Thursday and Friday of that week. A large attendance is expected.

Mailed December 10th, 1909.

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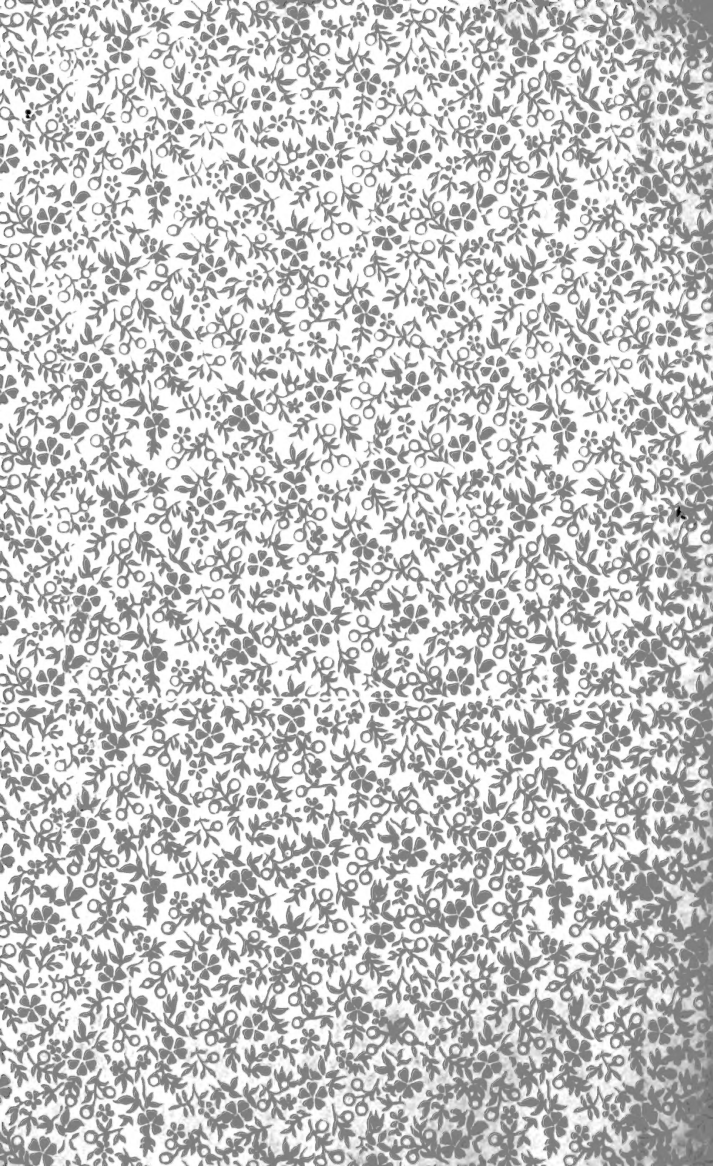
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